CEREAL SCIENCE today

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JULY 1956 VOLUME 1 NUMBER 2

AN OFFICIAL PUBLICATION
OF THE
AMERICAN ASSOCIATION
OF CEREAL CHEMISTS

OF INTEREST THIS MONTH

COCOA IN TODAY'S FOODS

THE TECHNICAL DIPLOMAT

FEED MANUFACTURE TRENDS

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N.F.D.M.S.

...see how

Sweet Dairy Whey

can improve quality and reduce costs TOO!

SWEET DAIRY WHEY is an improved dairy ingredient that perfects the richness of "old-fashioned flavor" in modern food preparations. It improves color, texture, shelf-life and appearance of food products. And it can save you money too — up to 50% of your dairy ingredient costs — by replacing part or all of your present dairy solids.

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Sherbet — for better control over texture, appearance, flavor. Reduces flavoring costs, too.

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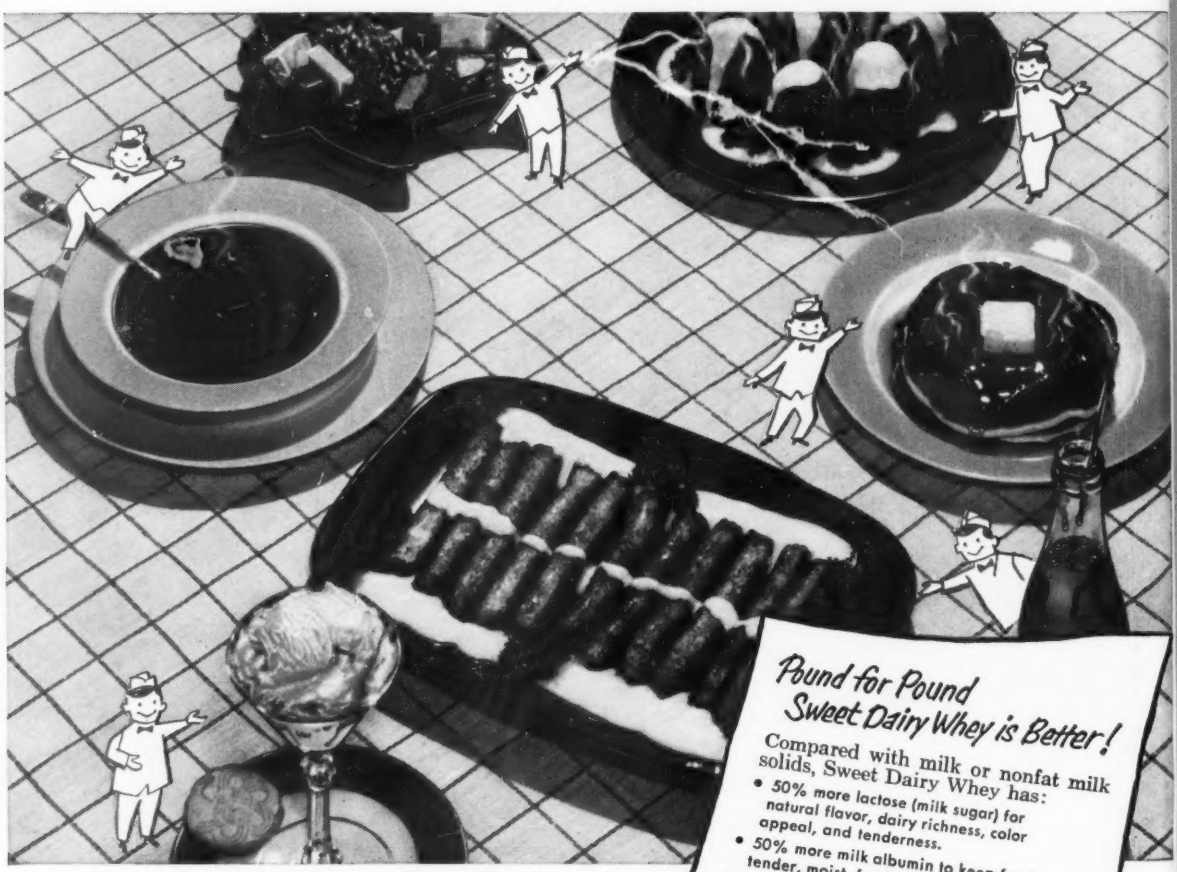

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WESTERN CONDENSING COMPANY
APPLETON, WISCONSIN
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32 plants coast-to-coast

The Vital Story of Vitamin B_1

(Thiamine)

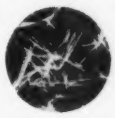
by Science Writer

History. The discovery of vitamin B_1 resulted from research into the cause of beriberi. Almost 50 years passed between Eijkman's discovery of the relationship of the disease to diet and the famous work of Jansen and Donath who first isolated the crystalline vitamin from rice bran.

Within ten years of that first isolation the vitamin's chemical structure was determined and it was successfully synthesized.

Eijkman's work resulted in the development of a theory that beriberi was caused by a lack of some factor in the diet and not by a toxin or infectious agent. This idea was not readily accepted until the growth of dietary knowledge proved it correct.

Isolation and Synthesis. In 1926 Profs. Jansen and Donath accomplished the isolation of crystalline vitamin B_1 from rice bran. In 1931 Windaus and co-workers successfully isolated pure vitamin B_1 and established its empirical formula. In 1936 R. R. Williams, and independently R. Grewe, explained the vitamin's chemical structure. That year, R. R. Williams and J. K. Cline accomplished the synthesis of thiamine which is in wide use today. Andersag and Westphal also synthesized the vitamin in 1936. Another synthesis was described by Bergel and Todd in 1937.



Photomicrograph of B_1 crystals

Chemical and Physical Properties. Thiamine hydrochloride is white, water soluble, with a nut-like, salty taste and yeast-like odor. Its empirical formula is: $C_{12}H_{17}ClN_4OS \cdot HCl$. Thiamine produced by synthesis is identical chemically and in biological activity with that obtained in pure form from nature.

Deficiencies. A deficiency of thiamine is characterized by these symptoms: depression, irritability, fearfulness, lack of initiative and interest, loss of appetite. Symptoms vary since in usual practice deficiencies of other water-soluble vitamins occur. Medical treatment is simple: a sufficient amount of thiamine is administered to relieve symptoms quickly and the physician provides for a continuing adequate intake.

Beriberi victim

A severe deficiency of thiamine leads to beriberi, a serious and sometimes fatal disease. While beriberi is almost a medical curiosity in the United States, it is common in countries in which polished white rice is a staple of the diet.

Human Nutrition Requirements. Thiamine is one of the nutritive elements the human body needs daily and does not store in quantity. The minimum daily requirements established by the U. S. Food and Drug Administration for the prevention of symptoms of thiamine deficiency disease are:

Adults	1.00 mg.	Children (1-5 incl.)	0.50 mg.
Infants	0.25 mg.	Children (6-11 incl.)	0.75 mg.

The Food and Nutrition Board of the National Research Council recommends the following dietary intake of thiamine for healthy persons in the U. S. A.

Recommended Daily Intake in Milligrams

Age	*Men*	*Women*
25	1.6	1.2
45	1.5	1.1
65	1.3	1.0
Pregnant (3rd trimester)		1.5
Lactating		1.5

The Council recommendations for infants and children vary below and above these figures, based on age and sex. Various illnesses and stress situations can exhaust vital reserves of thiamine. So, for the physician, vitamin B_1 is prepared in various dosage forms and potencies for therapeutic and prophylatic use.

How do human beings receive thiamine? It is widely distributed in foods of animal and vegetable origin, particularly cereal grains and dry legumes. Because of public demand for refined products which millers must meet for obvious economic reasons, a loss of thiamine and other factors occurs during processing. The thiamine loss is overcome through the use of *enrichment* in cereal grain products for which Federal Standards exist, or in other foods such as breakfast cereals, by *fortification* or *restoration*. When enriching, fortifying or restoring, the food processor adds the necessary amount of pure thiamine (and other vitamins and minerals) to the food so that the finished product meets Federal, state and territorial requirements or contributes to the consumer an amount of the vitamin which dietary experts believe significantly useful. .

Thiamine is extensively used for the enrichment of cereal grain foods such as white flour, white bread and rolls, macaroni products, farina, corn grits and meal, milled white rice. The story of these uses is delightfully told in a separate brochure which is available on request for reference or educational purposes.

Production. Huge production facilities at the Hoffmann-La Roche plant in Nutley, New Jersey, deliver highest quality thiamine *by the tons*. Roche manufactures thiamine hydrochloride and thiamine mononitrate. These fine products, which equal or exceed U.S.P. specifications, are ideal for use by pharmaceutical makers and food processors. Years of experience in research and manufacture have made Roche the leader in vitamins.

This article is published in the interests of pharmaceutical manufacturers, and of food processors who make their good foods better with essential, health-giving vitamin B_1. Reprints of this and others in the series are available on request. Write the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

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CEREAL SCIENCE today

FEATURES

TECHNICAL SECTION

DEPARTMENTS

STAFF

COVER: Dr. Lawrence Zeleny, new President of the American Association of Cereal Chemists

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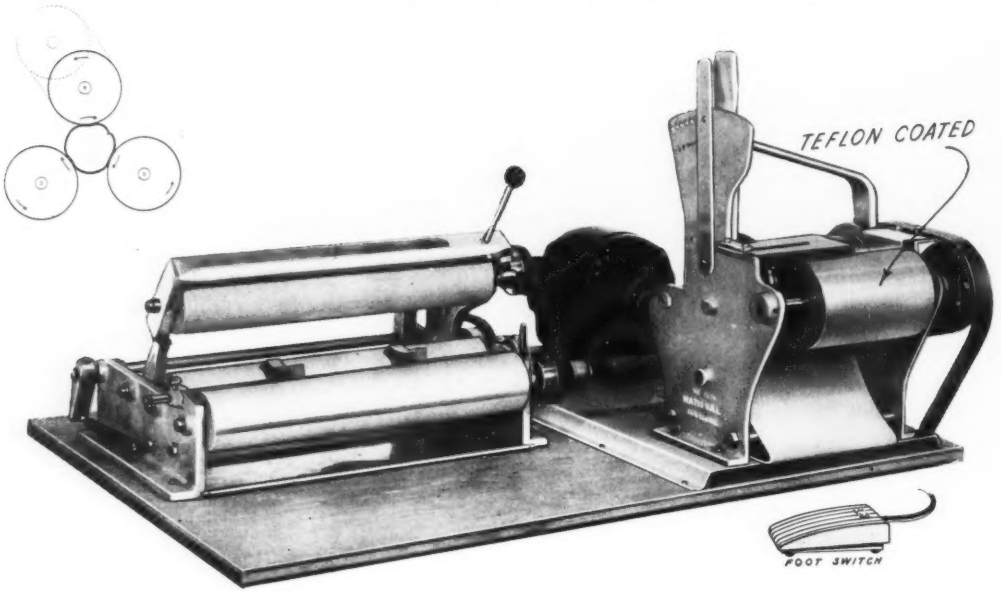
SOMETHING NEW for your Lab.!

the National

Teflon Coated SHEETING ROLL

as shown with Three-roll-type Moulder



"THREE-ROLL-TYPE" MOULDER
for all size loaves
PRICE — Moulder Only — $110.00
Includes flexible coupling which drives the unit from speed reducer of the sheeting roll. Also gauge pins for both "pups" and larger loaves.

Test Bake Moulding by "THREE-ROLL-TYPE" Moulder gives a mechanized action which is

(1) Gentle
(2) Effective
(3) Ends of doughs not abused
(4) Operation is visible

1 lb. SIZE (6" Width) TEFLON COATED SHEETING ROLL
Adjustable to sheet "Pups"
PRICE — Sheeter only, Teflon Coated — $240
Includes motor, speed reducer with power take-off for moulder and foot switch.

"PUP" SIZE (3" Width) SHEETING ROLL
with same equipment
$200.00

IF THE SHEETER AND MOULDER ARE ORDERED AT THE SAME TIME THEY ARE MOUNTED ON A COMMON BASE AS SHOWN IN ILLUSTRATION AT NO EXTRA COST.

EXPLANATION OF MOULDER:
Three hardwood rolls turn at 90 R. P. M. all in the same direction. The top roll is hinged, held up out of the way by spring tension for loading and unloading, yet instantaneously lowerable by operator to "mould" the sheeted and rolled dough. Stop pin of proper height assures of predetermined pressure, while extent of moulding is gauged by the number of revolutions of the roll. Black stripe on lower front roll is for convenience in counting the revolutions. Three revolutions could be said to be a "normal" moulding action. The moulded dough is then placed in the pan without further handling.

TEFLON COATED SHEETING ROLL
Great advantage over all earlier models from a standpoint of fast handling of doughs. Reduced ADHESION! Relieves the tendency to use more than a "trace" of dusting flour to dough. Any operator can readily "pick" the sheeted dough off the turning Teflon Coated roll. As the dust-free sheeted dough is rolled prior to the moulding process, it will be recognized that less "moulding" is necessary to make layers adhere to each other and thereby become a homogeneous loaf-in-the-making.

CEREAL CHEMISTS' EQUIPMENT MANUFACTURER

NATIONAL MFG. COMPANY
LINCOLN, NEBRASKA

Editorial

THIS MONTH OF June 1956, marking the 50th anniversary of President Theodore Roosevelt's signing the original Federal Pure Food and Drugs Act, seems a good time for taking stock of accomplishments.

While few of us recall conditions in existence prior to 1906, they unquestionably needed change, and they were changed as a result of 23 years of crusading by Dr. Harvey W. Wiley. I regard Federal food and drug legislation as among the most important commercial laws on our statute books, and the food industry should be gratified at the improvements which have been achieved, at least partly through the impetus of these laws.

In my own experience, both in industry and in the Department of Health, Education, and Welfare, I have seen the great and many progressive improvements that have resulted in the food supply of this country being clearly as clean and as safe as that of any country in the world.

Cereal chemists have had a large part in these accomplishments. They have helped develop the flour enrichment program, introduced new cereal products, and improved older items to meet the modern-day concept of having the food manufacturer do more and more preparation. This has resulted in less work for the housewife in her kitchen. Hand-in-hand with this developmental work, cereal chemists have made great contributions toward ensuring the safety and purity of these important items of daily diet. They have developed and refined methods not only of preparation but of testing and evaluating. These methods, designed for industrial application, have also been usefully applied by home economists and regulatory officials such as the Food and Drug Administration.

The close contacts between the industry's chemists, its consulting chemists, and the enforcement groups have been a source of gratification to all of us. In no small measure these contacts have aided industry, Government, and consumers. The more frequently Government and industry chemists meet and consult, the more each will benefit, and better, safer, more nutritious food products for American consumers should be the outcome.

Technological progress is continuing. This is as it should be, but let us recognize, in all our endeavors in this field, the cardinal principle that compliance with *both* the letter and spirit of our food and drug laws will result in mutual advantage to the consumer and to industry. The cereal chemists of America can render tremendous service to us in the Government and to the American consumer by ever keeping this principle before their industrial employers and sponsors.

BRADSHAW MINTENER
Assistant Secretary of Health,
Education, and Welfare

INTRODUCING

the authors

• JUSTIN J. ALIKONIS

Mr. Alikonis' experience with cocoa and chocolate embraces all phases of the industry: invention of processes and equipment; research on old and new ingredients in both candies and bakery goods; problems of production and quality control; improvement of existing techniques and introduction of new ones; and many published articles. He has received awards for outstanding contributions to technology in candymaking and in ration confections for the Armed Forces.

In an invited editorial (*Food Processing*, November 1954) Mr. Alikonis made clear his position regarding imitations and substitutes. The word may be frowned on, but often the imitation is better and cheaper than the original. When some product falls short on price, quality, shelf life, or supply, the skill of food technologists is challenged to make a better one at the lowest possible price.

Mr. Alikonis believes that so long as a substitution is clearly and correctly labeled, everyone gains and no one loses. He challenges government Standards of Identity, in that they may retard progress in food products if not revised periodically.

In the photograph, Mr. Alikonis is coating candy and cookie samples in the midget enrober.

• RALPH S. HERMAN

Crusading for an increase in the per-capita consumption of commercially baked products in the United States is Mr. Herman's principal hobby — so he tells us. This has grown, no doubt, to be an inseparable part of his thinking and doing over the years.

Vice-President of A.A.C.C.; director, Bakery Sales Association; President, Allied Trades of the Baking Industry; serving on advisory committees, Associated Retail Bakers of America and Millers' National Federation — these are some of the important posts through which he has served and is serving. He is now Director of Bakery Sales Service for General Mills, Inc.

Mr. Herman's deep and devoted interest in the milling and baking of flour has had far-reaching results for cereal chemists: his fathering of the so-called "pup" system of test baking, and many published papers in such fields as baking characteristics of flour; physical testing of flour; t technique of experimental milli and correlation of its findings commercial operations; more rece ly, baking industry trends.

Convention programs, local a national, have often enjoyed Mr. He man's able participation, as have t last two fall sales management se nars of the American Institute Baking.

• TOM BRINEGAR

Mr. Brinegar's brief autobiogr phical remark, "Raised on gene livestock farm in Nebraska," fu nishes a clue to all the forward-mo ing steps his career has seen so fa Each step has been consistent a has added to his broadening expe ence in the feeding of humans a animals and marketing their fo and feed. After his education at of Nebraska College of Agricultu and two degrees taken there, he w for a time a member of its researc and teaching staff. Then marketi and market research beckoned hi on for advanced study at Harva and Stanford Universities.

Even during World War II he sp cialized in his chosen work by ser ing in the Quartermaster Corps' Fo Research and Development Labor tory, publications and instructio branch.

The next step was logical — in publishing, where Mr. Brinegar do editorial planning with leading r search specialists in poultry and an mal nutrition for American Trad Publishing Company. Along wit that, he is Research Director of *Fee Age* magazine.

WANTED: MORE ABUNDANT RAW MATERIALS, MORE STABLE MARKET FOR

Cocoa and Chocolate In Today's Foods

by Justin J. Alikonis*

A MATTER FOR grave concern to cereal chemists since 1947 has been the price of cocoa powder. A spread from 4 cents to 72 cents per pound over the past 20 years has put this very popular product on shaky ground: can we continue using it, or must we find substitutes?

Let's review the origin and processing of chocolate and its by-products, and then look at the problems confronting us and consider means of solving them.

Cocoa and chocolate mean different things to different people. To the man in the chocolate industry, the true product is the "liquor" extracted from cocoa beans, whereas the general public more often thinks of cocoa powder.

Cacao (pronounced ka-kow' or ka-ka'-o), *chocolate liquor*, and *cocoa* are not synonymous terms. To avoid confusion, standardization is necessary. The writer, in line with the majority of scientists throughout the country who are working in the interest of the industry, prefers *cacao* to describe the tree and the bean. After being roasted and processed in the factory, the *cacao bean* is freed of its shell and germ to produce *cocoa nibs* which are ground to make *chocolate liquor*. *Cocoa* or *cocoa powder* is the pulverized residue after part of the *cocoa butter* is expressed from the chocolate liquor.

Thus cocoa powder was originally only a by-product. Eighteen years ago the beans were selling at 5 to 8 cents a pound and cocoa powder was a drug on the market, used as cattle feed and in fertilizer mixes.

The cacao tree is grown chiefly in West Africa, Brazil, Ecuador, the West Indies, and Venezuela. Its seed-pods look like elongated muskmelons or large acorn squashes, and contain approximately 40 to 60 cacao beans. After harvest, the beans are sun-dried for world-wide shipment to chocolate manufacturers.

*Director, Al-Chem Laboratory, Inc., Bloomington, Indiana.

Processes and Products

In the United States the beans are thoroughly cleaned and carefully roasted at controlled temperatures to bring out the full, true flavor and aroma; the outer shells are then removed, leaving the nib or meat of the bean. These nibs are ground in huge triple aloxite mills or other grinding or pulverizing equipment. Since they contain from 53 to 56% cocoa butter, the heat from this operation causes the nibs to melt and become a liquid mass known as chocolate liquor; this is molded and cooled in bars of various sizes to become the familiar baking, unsweetened, or cooking chocolate.

A minimum of 10% chocolate liquor is used in milk chocolate, 15% in sweet chocolate, and 35% in bittersweet. Extra cocoa butter needed for these and other purposes is extracted from the nibs or the liquor by various means. The portion remaining after extraction is pulverized and sieved to produce the cocoa powder, usually containing from 8 to 16% cocoa butter. Breakfast cocoa, by government standards, is cocoa powder with 22% cocoa butter.

Chocolate coating, under Federal chocolate standards, is a product made from chocolate liquor derived from the nibs.

It is universally agreed that the best chocolate quality and flavor are in the liquor, especially when produced from superior Accra, Bahia or Arriba beans. Cocoa powder, on the other hand, is generally produced from off-grade and poorer beans such as Sanchez mid-crop, Lagos, and mid-crop Accra, although cocoa powder from superior beans is readily available at a higher price.

The cereal chemist uses cocoa powder in most chocolate-flavored bakery items. But there is also much interest in using chocolate liquor in combination with it, since only this has the true flavor and the true aroma, which is so quickly detected; the sense of smell is not easily fooled here. The accompanying conversion table is intended to aid the cereal chemist who is interested in using chocolate liquor or a combination of the liquor and cocoa powder.

Alkali-treated Cocoas. Dark or "Dutch process" cocoas are manufactured by a process originated in Holland, using alkalis such as ammonium hydroxide, ammonium carbonate, potassium carbonate, sodium

TABLE I

CONVERSION FROM CHOCOLATE LIQUOR (54% BUTTERFAT) TO COCOA; COCOA (12% BUTTERFAT) TO CHOCOLATE LIQUOR

FOR CHOCOLATE LIQUOR IN FORMULA	REPLACEMENT		FOR COCOA IN FORMULA	REPLACEMENT	
	Use: Cocoa	Also Use: Wecobee Hard Butters,[a] Coconut Oil, or Shortening		Use: Chocolate Liquor	Subtract: Wecobee Hard Butters, Coconut Oil, or Shortening
lbs.	*lbs. oz.*	*lbs. oz.*	*lbs.*	*lbs. oz.*	*lbs. oz.*
1	... 8⅜	... 7⅝	1	1 14⅝	... 14⅝
2	1 ¾	... 15¼	2	3 13¼	1 13¼
3	1 9⅛	1 7⅞	3	5 11⅞	2 11⅞
4	2 1½	1 14½	4	7 10½	3 10½
5	2 9⅞	2 6⅛	5	9 9⅛	4 9⅛
10	5 3¾	4 12¼	10	9 2¼	9 2¼

[a] Manufactured by E. F. Drew Co., Boonton, N. J.

carbonate, sodium hydroxide, etc. Since few people outside of the chocolate industry are familiar with this term, Federal standards require that the label must read "processed with alkali" or "processed with ammonia." The maximum amount of alkali is also regulated, at 3% of potassium carbonate to each 100 parts by weight of cocoa nibs. Therefore, it is not permissible under government standards to neutralize the alkali treatment by the use of edible acids or salts; cereal chemists can, however, take the edge off this alkali treatment in the processing of various products.

Alkali treatment of cocoa varies; it may be slight treatment with 2 ounces of alkali per 100 pounds of nibs; medium processing in which some natural cocoa is added to heavily processed cocoa; heavy treatment with sodium hydroxide or other alkalis to produce dark colors such as in baking cocoas; or special treatment with steaming or prolonged heating to develop a very dark color.

Other chemical and physical changes take place when cocoas are treated with alkalis, in addition to those of flavor and color: a small portion of the cocoa butter is saponified; a small portion of the starch is gelatinized; cellulose materials swell; and the alkalis neutralize the natural cocoa acids and disintegrate some of the tissues. Further, there is a change in the bitter and astringent matter found in cocoa nibs, a marked darkening of the coloring matter, and a definite modification of the odor, flavor, and taste of the cocoa nibs.

Many feel that alkali-treated cocoas are more soluble than the untreated or natural product. It would be more accurate to say that they are capable of longer suspension in solutions, as a result of the above-mentioned chemical and physical changes.

Natural cocoas are also specially treated without alkalis, by steaming or prolonged heating to produce a change of flavor or color. These are called modified cocoas.

Fat-Free Cocoa Powder. A new product, available in large quantities and of particular interest to the cereal chemist, is the so-called fat-free cocoa powder which is solvent-extracted and has less than 1% cocoa butter. These powders are selling at 10 to 15 cents higher than ordinary cocoa powders containing 14 to 18% cocoa butter and are somewhat lacking in true chocolate flavor, but they have promise in specialty use and, as this use continues, the price will no doubt fall below that of ordinary cocoa powder through the usual economic processes.

Aided by technician, Mr. Alikonis evaluates molded "chocolate-type" bars made with different types of cocoa powder.

High Water Mark in Cocoa Prices

As long as cocoa powder was in abundant supply and prices were low, new uses and improved products using cocoa powder were developed. People acquired a taste for the products, and use of cocoa powder has increased a thousandfold, to a point where actually the by-product, cocoa, is more desirable in many instances than the cocoa butter; in fact, the surplus of cocoa butter has already become a problem to the industry.

But prices can reach, and perhaps already have reached, the point where people will substitute a lower-priced food and less cocoa powder will be used. Or a substitute chocolate flavor will be developed, such as that from toasted cereal grains which is even now available to the cereal chemist and is being used by many bakers as an extender for cocoa powder.

It is a basic economic principle that when a product is overpriced, consumers will buy a lower-priced substitute. Many times customers are permanently lost because they have acquired a new taste. Pure vanilla has never recaptured the market lost to synthetic vanillin; margarine is outselling butter daily; government-subsidized peanuts are so overpriced that people are forgetting the taste of peanuts and eating potato chips and popcorn instead. It seems inevitable that at 45 to 72 cents a pound for cacao beans, substitutes will be found.

Price-Stabilizing Indications

Confectionery coatings have been credited for lowering the price of cacao beans from its peak. Mr. John Whittaker of the New England Confectionery Company, Cambridge, Mass., reporting on these matters before the Western Candy Conference in San Francisco on March 2, 1956, said substantially: "A tangible benefit to our industry, derived from the chaos of high prices, was in the manufacture and use of confectionery coatings. Today a large number of manufacturers have resumed the use of chocolate, but some believe that confectionery coatings have a definite place in our industry. Research is continuing, and a coating may be de-

(Please turn to page 78)

Lab technician runs micro-atomized cocoa powder and coconut oil through Morehouse mill (3500 r.p.m.) to further reduce the size of cocoa particles.

QUALIFICATIONS: BAKERY EXPERIENCE, ENTHUSIASM, TECHNICAL SKILL . . . AND LIKING PEOPLE

The Traveling Technical Diplomat

by Ralph S. Herman*

AT TIMES, FLOUR millers must feel that their principal activity is that of placating unhappy or irritated bakery customers. In spite of the most rigid controls and safeguards to maintain uniform quality, mill products now and then fail to meet trade requirements. But millers perhaps forget that these same bakerymen are struggling, in their own field, to surmount customer complaints.

Actually, the milling industry enjoys a happy trade relationship, and customer complaints are low when measured against the total volume of flour delivered. It is, indeed, surprising that more difficulties do not arise, considering the variables introduced as grind is switched from one crop year to the next, and the great variations in flour usage on a national basis.

Can Flour Be All Things to All Bakers?

No one type of bread flour yet developed is capable of giving optimum results to all segments of the industry, under a wide range of shop conditions and with variances in processing and differences in formula ingredients both as to percentage and material.

It would be interesting to follow the placement of any one mill's daily production of one grade of flour. Some of it would be used within perhaps three days, and some not before three months or more of storage. The flour would be mixed at low speed as well as high speed. It would be used for hearth breads, rolls, specialty breads, and conventional white bread. It would be made up in sponge doughs and straight doughs. During processing, it would undergo a wide range of temperatures, mechanical abuses, and numerous other variations — all of which affect quality characteristics of the finished baked product.

In cooperation with bakery technicians, the milling industry's technical personnel have developed flour types having substantial tolerance in bakery usage. New baking techniques call for flour characteristics capable of tolerating a variety of demands that were unknown even 25 years ago. These characteristics have been developed, through wheat selection and flour treatment.

Many experienced bakery superintendents agree that a commercially acceptable loaf of bread can be produced from any flour, provided the flour is sound. To do so, however, may require major changes in formula and processing, and such changes are becoming more and more difficult in practice as mechanization and push-button operation are adopted by the baking industry. Each new development in this direction places more responsibility and more demands upon the miller. Because of the critical time schedule of production, a difference of one or two minutes in mixing time of a flour in some bakery plants today may represent the thin line marking off an acceptable from an unusable flour.

Trade Complaints

Among reactions from all classes of the baking industry, certain typical complaints filter back to mill management during the crop year: low absorption; sticky doughs; green flour; lumpy flour; bucky doughs; weak flour; doughs that slack off; poor color; capping and shelling of loaves; open grain; lack of tolerance; insufficient volume; insect fragments; high ash; low protein; excessive diastatic level; low diastatic level; and improper M.T.I. rating.

A large percentage of trade complaints can be traced to a misinformed salesman. An advantageous grade differential, perhaps, leads him to sell a type of flour measurably different in baking characteristics and quality from the type it is designed to replace. Again, mill instructions are occasionally misread, and bleaching treatment or maltose adjustment may go wrong.

Complaints involving baking irregularities are traceable to a few understandable factors. When dough is insufficiently mixed, the flour may be called weak and, of course, the volume and grain poor. Irregularities of temperature during flour storage and the use of cold flour in doughs have often been responsible for unsatisfactory baking results.

The experienced bakery service man will first check shop conditions and practice: differences in water supply (variation in pH and degree of hardness); too much or too little of oxidizing agents in the formula; too stiff a dough; too short intermediate proofing time; variations in and characteristics of ingredients other than flour; and insufficient scaling weight in relation to pan size. These are classic variables that are responsible for nonuniform and poor-quality bread.

Service operations have been forced to broaden as the baking and milling industries have developed, and now represent a most important cog within milling and allied industry operations. Functioning of personnel has increased its range, to the mutual benefit of industry and the retail trade.

*Director, Bakery Sales Service, General Mills, Inc., Minneapolis, Minnesota.

Qualifications and Duties of the Bakery Service Representative

The bakery service man was at first essentially a trouble-shooter, whose primary qualifications were knowing his way around a bakery and being a practical baker. His modern counterpart serves in a liaison capacity between the customer on the one hand and sales department, wheat and manufacturing departments, and management on the other. He must be qualified, through technical experience and skill, to serve multiple facets and interests. Above all, he must have a flair for his job.

Perhaps the perfect bakery service man has yet to be born! Logically, he should have qualifications such as to warrant management's full confidence, for he functions as their eyes and ears in the field. He is, in effect, a traveling technical diplomat — but he must be sufficiently versatile to make a thoroughly practical approach in all of his trade contacts. He needs a well-developed sense of humor. He must by instinct be optimistic and enthusiastic, but still a realist, and willing to give others credit for ideas or improvements that he himself may have initiated. He must *like* people and, to be worthy of his responsibilities, must be inherently and consistently honest, both with the trade and with his own associates.

In the modern concept of bakery service work, the individual should be interested in sales and merchandising as well as production. While complaints are still received by every concern in business — and probably will never be completely eliminated — the trouble-shooting phase of bakery service can be greatly minimized through management's guidance as to trade trends and acceptability of products.

A bakery service representative properly carries no direct sales responsibility; nor, in turn, should a salesman "double in brass" as a service man. The two functions are distinctly different as to application, although closely associated in a team approach designed to protect the supplier's interests and to build goodwill with the customer. The smart salesman will use a bakery service associate as a buffer between himself and his customer.

During the course of a year, your representative will be summoned by most segments of the industry, to face a wide range of problems. All complaints, regardless of character, must receive immediate and specific attention, for even the simplest dissatisfaction can build up in the mind of a customer as a major catastrophe if left unheeded and unresolved. Problems must be handled with tact. Difficulties should quickly be brought out into the open, and mistakes readily admitted if confidence is to be built and maintained, no matter how painful at the moment.

The top-flight man must be qualified and experienced in all phases of the baking process. He must be able to recognize malfunctioning of mechanical equipment. He must know fermentation, and be well posted on trade trends and developments such as the continuous mix and the brew process. He can be of practical help to his company associates in sales and in products control by interpreting, in commercial practice, processes and products created on an experimental level. The gap between the cereal chemist as such and the bakery technician has narrowed so much in the last few years that bakery service operation essentially amounts to

(Please turn to page 78)

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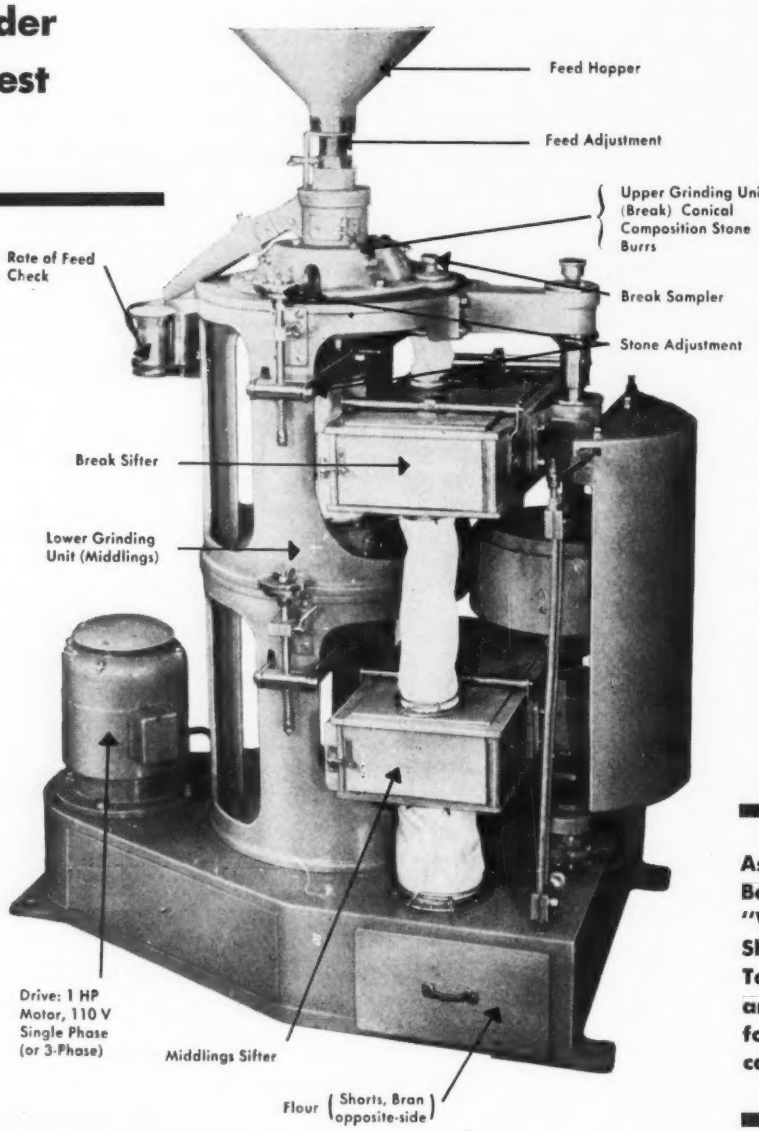

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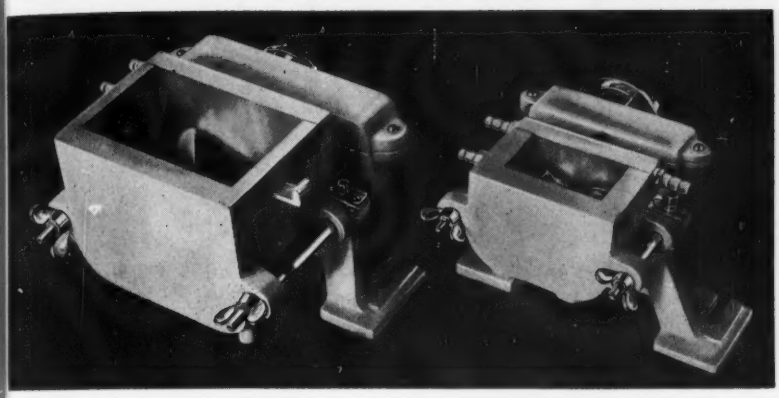

We can now offer the new Brabender-Hackensack Stainless Steel mixers, 1956 Series, in either the 300 g. or 50 g. sizes. We can calibrate these mixers with the same accuracy as the bronze mixers to either the world standard or other standard you may specify. These new stainless steel mixers can be relied on to duplicate the farinograph curves of the calibrated bronze mixers.

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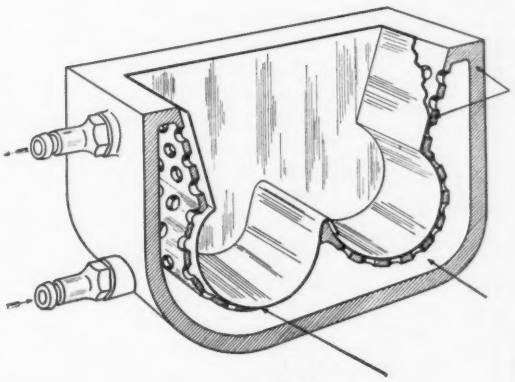
Calibration of bronze farinograph mixers has always been a difficult and time consuming process, requiring high skill and experience. With the introduction of stainless steel mixers, these problems became difficult beyond all expectation. We have refused to accept orders for calibrated stainless steel mixers for many years until we were in position to solve this problem. Poor heat transfer between mixer walls and dough and the lower thermal conductivity of the stainless steel were found to be the main problems in these calibration difficulties. Depending upon the kind of stainless steel used, we found that the rate of heat transfer could be as much as ten times lower than that of bronze.

Without further explanation, the above phantom drawing shows how we overcame this problem.



Heavy bronze frame with high thermal conductivity.

Thermostat - circulated water is brought into close contact with the dough, being separated from it by only 0.3 mm. wall.

Stainless steel sheet, only 0.3 mm. thick. The lower thermal conductivity of the stainless steel is compensated for by the extreme thinness of the sheet.

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A QUICK LOOK AT PRESENT AND FUTURE TRENDS IN

Feed Manufacture and Formulation

by Tom Brinegar*

IN A LITTLE over a dozen years the feed manufacturing industry has doubled in volume. Growth has been relatively steady for the past twenty-five years, and the long-term outlook is indeed bright.

Feed manufacturing is now big business. The industry ranks No. 9 among manufacturing industries in the country. What is the reason for this growth? The most direct answer is that farmers and feeders have learned by experience and through hardheaded business practices that it pays to use manufactured feeds, and also that feed manufacturing is a job for specialists. Twenty-five years ago it took 16 weeks and 14 pounds of feed to produce a 3-pound broiler; today it takes less than 8 weeks and less than 8 pounds of feed. Similar efficiencies — but to a lesser degree — have been achieved in producing feed for all kinds of livestock and poultry. Of course better breeding and management have also been factors, but it is a well-recognized fact that improved nutrition is the primary contributing factor to the feeding efficiency which has been the foundation of the industry's growth.

The great amount of research done by experiment stations at agricultural colleges, together with the excellent nutritional research conducted by supplying firms, has contributed immensely to this amazing progress.

Of course, manufacturers themselves are thoroughly quality-minded and are continuing to improve their own facilities for research and quality control. Recently the American Feed Manufacturers Association made a survey of 63 manufacturers who are represented on the *association's* nutrition council. The results showed that these firms have over 1,100 workers supervising the growing and testing of about two million head of livestock and poultry in their research farms and laboratories. The increasing acceptance of manufactured feeds is a tribute to the thoroughness of basic research, applied research, and the practical field testing which ensures a quality manufactured feed.

*Vice President-Research Director, *Feed Age* Magazine.

Current Status

The feed manufacturing industry has been affected to some extent by the economic climate in which agriculture now operates, but 1956 is expected to be at least as good a year as was 1955. In addition there should be some increase in domestic demand due to population growth. Total tonnage of feed sales dropped 4% in 1955 as compared with 1954, but of course, as the result of increased conversion efficiencies of modern feeds, tonnage is no longer the best measure and we must accept the fact that a given quantity of food will be produced by a continuously smaller volume of feed.

The dollar volume of feed sold last year was roughly 3½ billion, and leading authorities predict a trend toward a steadily greater percentage of manufactured feed being used. In 1946 only 20% of all feed consumed by the nation's livestock and poultry, exclusive of roughage and pasture, was manufactured feed; in 1955 this percentage figure had risen to 30. Men of the industry who are best informed seem to feel that an ultimate percentage of about 60 will be manufactured feed. Thus, aside from factors of increased population and price change, the industry should be about twice as large as it is now — in other words, it has an indicated potential of about 7 billion dollars in volume.

Factors Influencing Potential Growth

American consumers now have a record amount of money to spend and they have indicated a strong desire to spend a good share of it for meat, milk, and eggs. To name a few examples from U. S. civilian per capita figures: in the past 35 years consumption of red meat has risen 15%; dairy products are up 7%, eggs 36%, and poultry meat 79%, whereas wheat and corn products have dropped off 34% and potatoes 24%.

Both the short-range picture and the long-range potential look optimistic indeed. Beyond the efficiency of the product as a factor for industry growth, there is the growing trend just mentioned for the American consumer to consume more proteins — products of manufactured feeds — and this will most certainly result in a continuation of the trend toward increased animal agriculture. Then too, beyond the changes in make-up of the American market basket, there is the matter of population increase which, most experts tell us, is expected to continue at an annual rate of 1 to 1½% for a good many years to come. Not only is population continuing to increase, but it seems to be doing so at a constantly accelerating rate. In the 1920's the United States gained 17 million in population, in the 30's, 9 million, and in the 40's 19 million; the 50's are expected to add 29 million more mouths to be fed in this country.

One of the leading market research men of the feed industry makes another very important observation on

population trends: the babies who started these population trends on the upward swing are now reaching the age when they are mighty hearty eaters. A boy 10 or 12 or 14 years old consumes a lot of milk, likes a big breakfast, and certainly can put away plenty at lunch time and at dinner. For many years to come there will be a steady increase in the number of youngsters who enter this "heavy-eating" age group.

Thus there are many factors favoring the continued growth, both in the immediate and the long-range future, of feed manufacturing which is now one of the ten top manufacturing industries in the United States. And, of course, as feed manufacturing grows, so will demands for improved ingredients, especially those produced by the chemical industry.

Formulation Trends

The emphasis during the past ten years on increasing average weight gain and improving feed efficiencies promises to continue. The feed manufacturer has had his attention directed forcibly to "productive energy values of feed" as presented by Frapps at the Texas Agricultural Experiment Station. Dr. G. F. Combs of the University of Maryland has recently shown that for best results in the production of broilers it is important to maintain a calorie-protein ratio of approximately 42 calories per unit of protein. These ideas, of course, are not new to the field of nutrition, because nutritionists dealing with large animals have historically stressed the importance of the nutritive ratio.

Dr. Combs did, however, prove that the calorie-protein ratio can be utilized to develop phenomenal rates of gain. For example, on an experimental diet he produced a 3-pound broiler in 52 days with only 4.8 pounds of feed. This, of course, is spectacular, and while the diet is not currently commercially practical, it does point the way to the future thinking of research and formulation scientists.

Future Ingredients

Many relatively new growth-promoting and protective ingredients are being used. There is no question but that it would be impossible to produce broilers without feeding a coc-

(Please turn to page 78)

Records Broken at A. A. C. C.

Largest attendance, largest technical program, and highest number of overseas guests and nonmember visitors mark the 41st Annual Meeting in New York as a success

Top: President's reception on Sunday evening. In the foreground are President-Elect Bradley and incoming President Zeleny greeting A.A.C.C. members. Bottom: View of Monday morning's registration. The young ladies served by courtesy of the Convention and Visitors' Bureau.

National officers of the A.A.C.C. Left to right, Cl... Se... retiring President; Lawrence Zeleny, incoming Pr... B... bers of the Board of Directors were Mark A. Be...m

THE AMERICAN ASSOCIATION of Cereal Chemists held its 41st Annual Meeting in New York City, May 20-24. Approximately 650 technical registrants and 160 ladies attended the five-day event.

Some 70 papers divided into ten separate sessions made up the technical program. The Monday afternoon session on Nutrition was particularly outstanding, with nutrition experts from all over the country presenting the papers. The subject was appropriately introduced during the morning's Opening Session by Drs. C. G. King and Raymond W. Miller. Dr. King discussed the importance of cereals in human nutrition and commented on his recent trip to India. As an agricultural consultant to governments across the globe, Dr. Miller is well qualified to give his views on the "human element" in changing dietary patterns. Strong religious beliefs and/or social traditions, he pointed out, often make the public relations phase of a nutrition consultant's task as important as the

Meeting

ht, Cl Secretary; D. B. Pratt, Jr., Treasurer; W. H. Cathcart, ng Pr B. Bradley, President-Elect. Also elected as new mem- A. Bo m L. Rainey.

At the left, Dale Mecham, Wilbur Claus, and James Pence talk over plans for the San Francisco meeting in 1957. On the right, Harry Alleman of Kroger Foods, Howard Simmons of Midwest Laboratories, and Frank Schwain of Proctor & Gamble are getting into fine Convention humor.

Left to right: Frank C. Hildebrand and W. F. Geddes greeting some of the distinguished overseas members of the A.A.C.C.: Jean Bure, France; Sven Hagberg, Sweden; and Tom Moran, England.

At the left are Marjorie Howe and V. E. Fisher of Russell-Miller, and Fred Schmalz of King Midas. Pictured at the right are more of our overseas visitors: from the left, Eric Bond of Australia; C. H. Warburton, Francis Birkett, and J. B. M. Coppock who were here from England.

technical phase.

Dietary problems around the world were discussed by a group of prominent authorities at an afternoon press conference. The panel consisted of Robert A. Peterman, Bureau of Nutrition, New York; Tom Moran, Association of British Flour Millers, England; J. B. M. Coppock, British Baking Industry Research Association, England; Eric Bond, Bread Research Institute, Australia; N. H. Flodin, E. I. du Pont de Nemours, Delaware; William B. Bradley, American Institute of Baking, Chicago; C. A. Elvehjem, University of Wisconsin; Werner R. Schaefer, Federal Research Institute of Cereal Industry, West Germany; Sven Hagberg, Statens Hantverksinstitut, Sweden; Raymond W. Miller, Harvard University; C. G. King, Nutrition Foundation, New York; Arne Schulerud, Statens Teknologiske Institutt, Norway.

The discussion centered around protein deficiency and how to combat it. The serious problem facing

National and local section officers gather at their annual luncheon meeting.

L to R: Clarence Gerbrandt, J. R. Short Canadian Mills, Leaside, Ontario; C. G. Ferrari, J. R. Short Milling, Chicago; and Tyler R. Stevens, American Machine & Foundry.

From left: Noel Kuhrt and William Simcox, both of Distillation Products Industries; and J. Avery Dunn of Atlantic Gelatin.

India was pointed out by King, Miller, and Hagberg. In areas where plants are the major source of protein, cases of serious protein deficiency are prevalent. Low income and religious convictions regarding beef animals combine to give the Indians a particularly bad problem. The establishment of dairy herds with the aim of greatly increasing milk consumption is being relied on to help solve the situation.

The Association's business meeting was highlighted by two major events: the official announcement of election results and the adoption of a revised A.A.C.C. Constitution permitting incorporation in the state of Minnesota. William B. Bradley, Technical and Scientific Director of the American Institute of Baking, will take over the office of President-Elect, replacing Lawrence Zeleny who will serve as President during the coming year. William H. Cathcart, retiring President, will serve on the Board of Directors. The membership reelected D. B. Pratt, Jr., to serve another two years as Treasurer, and voted in Mark A. Barmore and William L. Rainey to fill in vacancies on the Board of Directors.

The Association was especially fortunate in having a large number of overseas members and guests in attendance at New York. From England came Tom Moran, J. B. M. Coppock, C. H. Warburton, and Francis K. Birkett; from France, Jean Buré; from Australia, Eric Bond and Kevin Paul; from Switzerland, Per Ringnes; from Germany, Werner R. Schaefer; from Sweden, Sven Hagberg; from Norway, Arne Schulerud. Many of these people visited laboratories and plants throughout the country before the New York meeting, and others will do so on their return journey.

Social activities at the meeting began with the President's Reception on Sunday evening and were highlighted by a record attendance at the Banquet on Wednesday evening. An excellent stage show and fine dance music followed the dinner.

A. A. C. C.

LOCAL SECTIONS

The Canadian Prairie Section held a special dinner meeting on Monday, May 14, to hear an address on wheat conditioning by Dr. Werner Schaefer, Milling Department, Federal Cereal Research Institute, Detmold, Germany. The Prairie Section, A.O.M., was invited to attend, since the topic was of interest to both cereal chemists and millers.

• • • •

Meeting on March 28, the Chesapeake Section elected the following for the coming year: W. W. Prouty, chairman; K. L. Harris, vice-chairman; H. B. Dixon, secretary-treasurer. Two new board members are W. S. Hodges and R. J. DuBois.

• • • •

The Cincinnati Section met on April 6 and 7, jointly with Ohio Valley Section, I.F.T., in Cincinnati. New officers of the section are Joe Zvanovec, chairman; R. G. Snow, vice-chairman; C. J. Steele, secretary-treasurer. Ralph Lakamp was appointed convention chairman for the 1958 AACC Convention to be held in Cincinnati. Next meeting, jointly with Ohio Valley A.O.M. in Marion, Ohio, Sept. 28 and 29.

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Midwest Section's new officers elected April 2: W. B. Bradley, chairman; C. S. McWilliams, vice-chairman; R. B. Koch, secretary-treasurer. Dr. Bradley talked briefly on how the Executive Committee of the Association chooses the places where future national conventions are to be held. On his suggestion that Chicago should be the place for the 1959 convention, it was unanimously voted to extend the invitation to the Executive Committee for that year.

• • • •

The Nebraska Section has a tentative program for 1956-57 that should ensure well-attended meetings. June, dinner in Omaha, wives included, to hear reports of National Meeting. Annual picnic in August . . . corn on the cob? watermelon? Count us in! September, in Omaha, panel on crop reports. October, tri-section meeting in Manhattan. November, in Lincoln–subjects and speakers: Bulk transportation, D. W. Conrad; bulk storage bin equipment or pneumatic flour handling, B. D. Crissey; rheology of doughs and leavening, R. Joslin. Meetings for 1957 will be noted later.

• • • •

A subject of great interest to cereal chemists—browning reactions — was chosen for the New York Section's last meeting of the 1955-56 season on May 8 at Hotel George Washington. Ralph G. Moores of General Foods' Central Laboratories in Hoboken, N. J., discussed the chemistry and application of browning reactions and described recent work and methods for controlling them. He said there is a possibility that control in future will produce only desired flavors, odors, and colors. New officers are: Lloyd B. Crossland, chairman; Donald B. Davis, vice-chairman; Otto G. Jensen, secretary-treasurer.

The Niagara Frontier Section's annual picnic takes place on June 23 at Java Lake near East Aurora, N. Y., from 3 p.m. until, probably, everyone is happily tired out and the barbecued chicken *a la* Jordan is only a blissful memory.

• • • •

The Pioneer Section met April 20 and 21 in Wichita, and elected new officers: J. M. Mills, Chairman; L. P. Carmony, vice-chairman; Claude Neill, secretary-treasurer. Ralph Potts continues as chairman of the Crop Reporting Committee. Galen White, USDA, Manhattan, Kansas, spoke on and demonstrated the flotation method of determining hidden insect infestation. H. H. Laude, agronomist of Kansas State College, predicted a good wheat crop for all of Kansas except the extreme western part. Pioneer Check Sample Trophy Awards were presented for exceptional analytical work to: H. H. Johnson, moisture; Homer Poe, ash; Gerald Miller, protein; W. V. Parker, maltose.

• • • •

New officers of the Northwest Section are B. Marlo Dirks, chairman; P. E. Ramstad, vice-chairman; J. E. Bailey, secretary; Edward Liebe, treasurer. The vice-chairman serves as program chairman.

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NOTE: Section chairmen are reminded that all meeting notices or advance program schedules for the coming year should be sent to the AACC headquarters as soon as they are available.

R. TARLETON

AN EVALUATION OF METHODS AND EQUIPMENT USED FOR SANITATION ANALYSIS[1]

ROSS H. CORY, Subchairman, Sanitation Methods Committee, A.A.C.C. — General Mills, Inc., San Francisco, California

THE ANALYSIS OF wheat flour for contamination with insect fragments and rodent filth involves three basic steps: 1) conversion of the flour constituents to soluble materials, 2) separation of extraneous matter from digested material by means of flotation, and 3) microscopic examination of the residue.

The starch and proteins may be converted to sugars either by acid hydrolysis or by enzyme digestion (generally pancreatin or clarase). A Wildman trap or separatory funnel may be used in the flotation step. With acid hydrolysis, mineral oil is generally added, since the oil wets both the fragments and rodent hairs and helps to keep them at the surface. Prior to microscopic examination of the residue, the vegetable material often is stained with either methylene blue or methyl green as an aid to recognition of the insect fragments.

One of the duties of a methods committee is to determine and evaluate methods currently in use. This must be done before any new or proposed method can be evaluated. This paper reports the results of two surveys of methods, techniques, and equipment being used at present. It also correlates the results of the second survey with results obtained on sanitation check samples of the 1953-1954 series.

Method

In order to obtain as representative a picture as possible, a survey questionnaire was directed to all persons known to be making sanitation analyses. Points covered by the questionnaire included digestion method, use of oil, separation method, use of stain, sample size, and degrees of magnification used in examining residues.

A second questionnaire was sent to those subscribing to the Sanitation Check Sample Service. It covered only those points dealing with digestion and separation methods, use of oil, and use of stain.

As a means of relating methods and equipment used with results obtained on the check samples, a "performance rating" was calculated for each collaborator. This performance rating is the average ratio of numbers reported by the individual, compared to the mean numbers reported by the group. Table I shows the performance ratings calculated for two individuals. Group performance averages were calculated from individual performance ratings. For example, performance ratings of all those who use acid hydrolysis with oil, separatory funnel, and stain are grouped together and a weighted performance average was calculated for the group.

[1] Manuscript received January 3, 1956. Presented at the annual meeting, St. Louis, Missouri, May 1955.

Some may object to this method of rating perfor ance because many persons tend to report flakes of br as insect fragments. This may be true of certain indivi als. However, when group averages are considered, the

TABLE I
CALCULATION OF PERFORMANCE RATINGS

Sample	Mean of All Reports	Collaborator A		Collaborator B	
		Reported	Performance	Reported	Performa
E1	5.25	9.5	172	3.5	63
E2	5.72	7.0	122	3.0	52
E3	24.68	35.0	142	8.0	32
E4	26.40	56.0	220	8.0	31
E5	19.50	47.0	275	17.0	89
E6	7.40	9.5	125	5.5	72
E7	6.14	9.5	154	3.5	57
E8	28.80	71.0	296	9.5	37
E9	21.30	41.5	192	8.0	38
E12	5.24	1.0	19	2.0	38
Performance Rating			172		51

is no reason to assume that these persons are confin to any particular group. Therefore, comparisons of gro performance averaged should be valid. This subject w be mentioned again in the Discussion.

Results

Fifty-nine questionnaires were returned on the fi survey. The most important findings of this survey a summarized in Fig. 1. The vast majority used acid h drolysis, although a few used enzyme digestion in pre aration of the sample for examination. Of those wh digested the sample by means of acid hydrolysis, 88 did so in the presence of mineral oil. Both Wildman tr and separatory funnel were used to separate fragmen and filth from the liquid after digestion. The separato funnel was most widely used, and many of its users e ployed methylene blue or methyl green to stain the veg table matter as an aid to recognition. Few analysts wh used the Wildman trap used stain.

Additional trends disclosed by the survey but n summarized in Fig. 1 are:

1) The amount of mineral oil used during acid hydrolysis ranged from 2.0 to 50 ml. The amount most commonly used was 20.0 ml.
2) Microscope magnifications used for scanning varied from 12× to 45×. The average was 29× and the most commonly used was 30×. Similarly, the magnifications used for confirming observations ranged from 24× to 150×. The average was 62× and the most commonly used was 60×.
3) A 50-g. sample was used by nearly all of those reporting. Most of those who did not use a 50-g. sample used a ¼-lb. sample and reported on a basis of 1-lb. sample.

Groupings as determined by the second survey a shown in Fig. 2. They are essentially the same as tho shown for the first survey (Fig. 1).

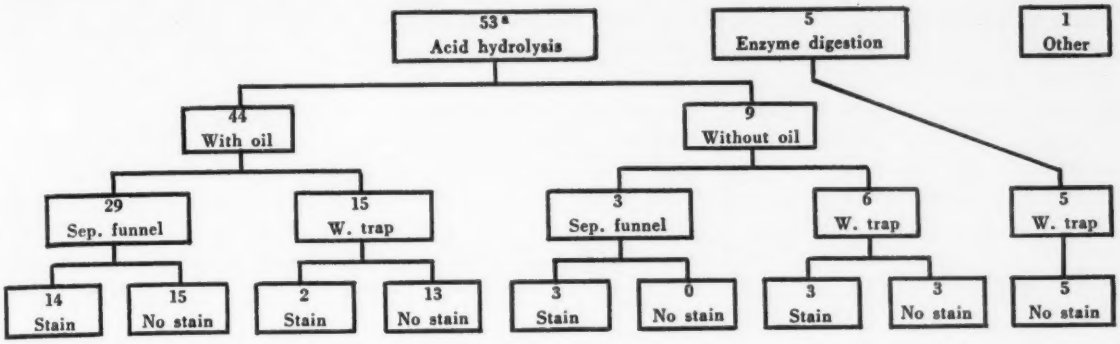
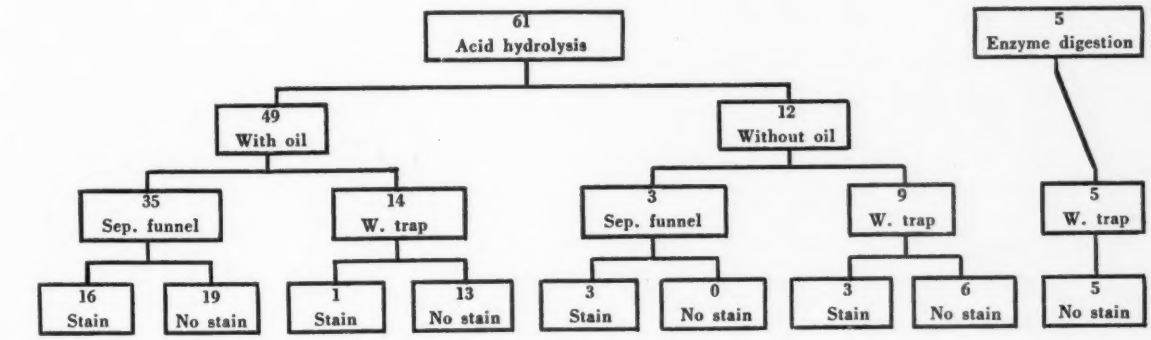
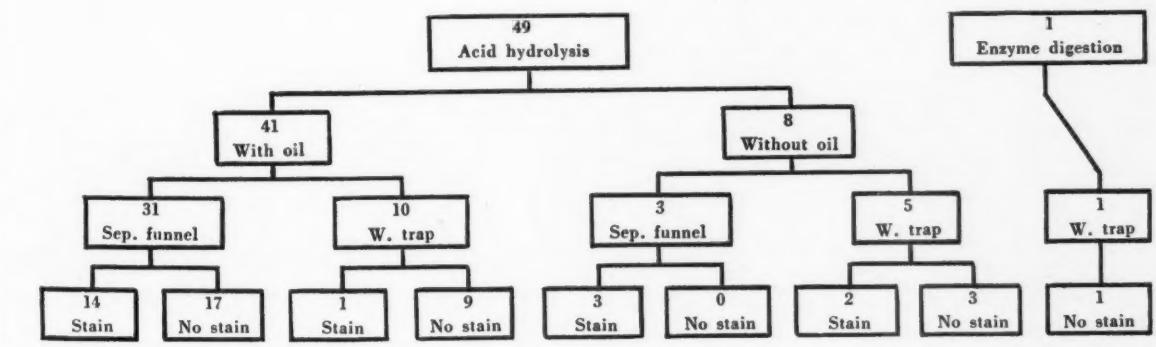


Fig. 1. First sanitation method-equipment survey. The number above a word or phrase indicating a method refers to the number of persons in the group.



Group No.	1	2	3	4	5	6	7	8	9
No. of tests	113	120	10	74	19	0	18	30	29
Performance average	105	75	96	90	111	...	133	79	116

Fig. 2. Second survey groupings and performance averages. For an explanation and demonstration of the method of calculation of "Performance averages" see "Method" and Table I.



Group No.	1	2	3	4	5	6	7	8	9
Av. fragments reported									
Patent	33.5	18.7	32	19.8	26	...	14	7	86
Clear	30.1	15.1	26	16.3	22	...	20	12.4	48
Av. rodent hairs reported									
Patent	6.8	9.8	14	8.8	8	...	1	4	8
Clear	8.1	8.5	9.5	8.3	8.2	...	2.5	2.5	9.5

Fig. 3. Group performance on seeded samples. The number above a word or phrase indicating a method refers to the number of persons in this group.

Samples E3 and E5 of the 1953-1954 sanitation check sample series were seeded with insect fragments and rodent hairs. The fragments were obtained by experimental milling of very heavily infested stock. Rodent hairs were obtained by experimental milling of wheat to which had been added 5% by weight of mouse pellets.

Sample E3 was a hard-wheat patent, and E5 was a clear flour from the same wheat blend. Both samples were seeded to the same level of contamination.

Figure 3 shows average numbers of fragments and rodent hairs reported by each group. Only the reports of those collaborators who reported on both samples were used in the compilation of the data presented.

Discussion

One of the tasks of the Sanitation Methods Committee is to evaluate the methods and techniques now in general use. Differences in methods and techniques are only partly responsible for the differences in results obtained by collaborators. Other causes for differences are variations in manipulative skill and variations in ability to count fragments and rodent hairs.

Only when these other causes for differences can be eliminated or cancelled out will it be possible to measure differences due to methods and techniques. If several different approaches to the question yield substantially the same answers, the validity of any conclusions drawn will be more certain. The survey approach is only one of several that have either been tried, are now under way, or are planned for the future.

Sixty-one of those returning the second questionnaire used the acid hydrolysis method of digestion (Fig. 2). This group is large enough so that its subdivisions should still furnish enough cases to give at least an indication of trends.

Only five of the total used enzyme digestion. This number is rather small. Also, two of the five represent government laboratories, and are probably above average in manipulative skill and counting ability. With so few cases represented, these two laboratories could exert a strong influence on the average performance of the group. Any conclusions that might be drawn from a comparison of the performance average for this group with the averages for the other subgroups might well be in error. For this reason, all of the comparisons are made among the subgroups of those who used the acid hydrolysis method of digestion.

Comparison of the performance averages of groups 1 and 2 indicate that the use of stain should give about 40% better recovery than nonuse. In the same way, comparison of groups 2 and 4 indicates a superiority of 20% for the Wildman trap over the separatory funnel. This runs counter to data that are being accumulated through other lines of approach. Comparison of groups 4 and 8 indicates approximately 14% better recovery when oil is used in conjunction with acid hydrolysis. Group 8 has so few cases that not much significance can be attached to this comparison. However, this same comparison made through other lines of approach shows even greater difference in favor of the use of oil.

An inspection of the average numbers reported by the different subgroups on the two seeded samples (Fig. 3) shows, for fragments, the same trends as in Fig. 2. However, as would be expected when results on only two samples are compared, these trends differ somewhat in degree.

Two of the above trends are reversed in the rodent hair reports. Nonstain makes a better showing than stain and separatory funnel makes a better showing than Wildman trap.

This is the first sign of a pattern that is assuming form from the work of the committee. Methods and techniques that appear to give better fragment recovery sometimes do not do so well with rodent hairs.

It has been assumed that those persons and groups reporting the highest results have the best recoveries. As mentioned above, there might be some objection to this on the ground that those reporting high results are probably counting bran flakes as fragments. An inspection of the results on the seeded samples (Fig. 3) should refute this. Clears furnish much more branny residue than patent flour, and hence more particles of bran that might conceivably be mistaken for insect fragments. The two samples under discussion were seeded to the same level of contamination. If many persons were making the error of counting bran flakes as fragments, it would be expected that general averages and group averages of numbers of fragments reported would be higher on the clear sample than on the patent. Actually, the opposite held true. Only two of the smaller groups reported more fragments in the clear than in the patent. The mean of all reports on the patent flour (E3, Table I) was 24.68 and the clear (E5) was 19.5. This would indicate that the error of counting bran flakes as fragments cannnot be very general.

Conclusions

Correlation of the results of a sanitation method and equipment survey with the results reported on samples of the 1953-1954 sanitation check samples series indicate the following:

For insect fragments:

1) More will be recovered when mineral oil is present during acid hydrolysis.
2) Wildman trap separation will give slightly better results than separations with separatory funnel. (There is evidence from other sources to contradict this.)
3) Proper use of a biological stain increases the number of fragments found.

For rodent hairs:

1) More will be recovered when oil is present during acid hydrolysis.
2) Slightly more will be recovered when a separatory funnel is used.
3) More will be found if no biological stain is used.

All of the above conclusions are tentative. Other work now planned or in progress may confirm or disprove them.

Summary

Results of two sanitation methods and equipment surveys are reported. The first survey covers digestion

and separation methods, use or nonuse of stain, sample size, and magnifications used. The second survey was made of those using the Sanitation Check Sample Service.

Performance ratings of all sanitation check sample collaborators have been calculated, and from these, performance averages have been calculated for each group. Comparison of these averages indicates that for insect fragments, acid hydrolysis digestion with mineral oil is definitely superior to acid hydrolysis without mineral oil, and stain techniques superior to nonstaining. Few persons use enzyme digestion. The use of Wildman traps gave slightly better recoveries than separatory funnels.

For rodent hairs, two of the above findings are reversed. Stain tends to obscure rodent hairs. Use of the separatory funnel gives slightly better recovery than the Wildman trap.

A STUDY OF FACTORS INFLUENCING ACCURACY IN COUNTING INSECT FRAGMENTS AND RODENT HAIRS[1]

ROSS H. CORY, Subchairman, Sanitation Methods Committee, A.A.C.C. — General Mills, Inc., San Francisco, California

THE WORK OF the Sanitation Methods Committee of the A.A.C.C. has always been hampered by inability to obtain agreement of results between collaborators. The results obtained on the 1953-1954 sanitation check samples were typical[2]: on sample E2 of the series, where agreement was best, the highest number of fragments reported was five times that of the lowest reported. Agreement was poorest on sample E3; here, the ratio between high and low was 63 to 1. The mean of the high-low ratios for ten of the twelve samples of the series was 26 to 1.

The three main causes for differences in results in sanitation tests, in decreasing order of importance, are believed to be differences in counting ability, differences in manipulative ability, and differences in method.

This paper describes an attempt to measure and evaluate some of the factors involved in accuracy in counting insect fragments and rodent hairs. Its object was to find and point out to each collaborator his areas of strength and weakness in this type of work. It was hoped that this would tend to improve the general quality of sanitation work, and thus make individual tests more reliable. This, in turn, should increase the significance of results of collaborative work reported by the Sanitation Methods Committee.

Method

Residues of flour from sanitation tests, containing insect fragments and rodent filth, were filtered onto cross-sectioned filter papers. These filter papers were embedded in a thin layer of paraffin and routed, in pairs, to the collaborators. The flour used for these tests was a hard-wheat clear to which had been added small amounts of concentrates obtained from experimental millings of wheat infested with weevil, middlings stock infested with confused flour beetle and broad-horned flour beetle, and wheat to which had been added 5% of mouse pellets.

Eight different method variations were tested in duplicate. One of the resultant slides was stained with methylene blue and the other was left unstained. Each pair of the eight sets was made up of one stained and one unstained slide. Set 2 was read by nine collaborators. The other seven sets were read by ten persons.

One type of microscope light[3] furnished enough heat to melt the paraffin while the slides were being read. Those who were not using this type of light used a substage warmer, consisting of a box containing a 100-watt bulb which furnished ample heat to melt the paraffin.

The cross-sections of the filter papers were identified by letter and number. Special report forms were marked off in cross-sections to correspond with the same squares on the filter papers. Using these report forms, the collaborators reported the numbers and locations of all fragments and rodent hairs found.

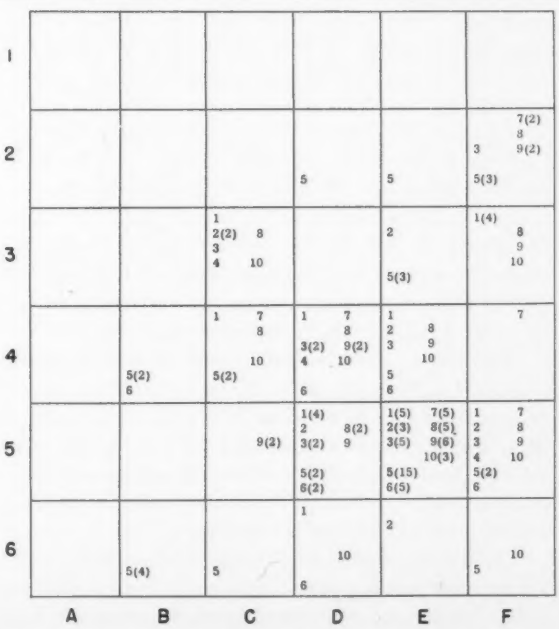


Fig. 1. Fragment locations, set No. 5, unstained slide.

[1] Manuscript received January 3, 1956. Presented at the Annual Meeting, St. Louis, Missouri, May 1955.

[2] A.A.C.C. Check-Sample Service reports to collaborators (unpublished).

[3] Bausch & Lomb Reflector-Illuminator.

The individual reports were combined on two master reports for each slide, one to show fragment locations and one to show locations of rodent hairs. These master reports also were marked off in squares to correspond to those on the filter papers. Figure 1 shows a portion of one of these master reports for fragments. Each collaborator is identified by number. A number within a square shows that the collaborator identified by that number reported a fragment there. A number in parentheses following the collaborator's number shows how many fragments (when more than one) he has found there. For example, in square 5D collaborator number one reports four fragments, number two reports one, and number four reports none.

Statistical Treatment

A method has been improvised to evaluate these master reports. As it is not a standard statistical method, it should be explained in detail.

The first step was to decide how many reports would be necessary to confirm the presence of a fragment or rodent hair within a square. A statement in the training material furnished by the Millers' National Federation to those attending their fragment counting schools provided a helpful clue:

> "Recent well-organized collaborative studies demonstrated that while the total number of insect fragments reported by individuals on any given slide may vary considerably, these experts agree perfectly when examining any one fragment. It is therefore concluded that a very important cause for lack of agreement is difference in visual acuity."

The use of five as the confirming number would ignore the visual acuity factor. This would assume that there was a particle in the square that all had seen, and which half of the collaborators had decided was a fragment. This would not be true. Other work, as yet unpublished, shows that such fragments as mandibles, antenna segments, leg and foot parts that are present on a slide have about a 50% chance of being seen by all. When the fragment is less likely to be instantly recognized, its chance of being seen by all is much less. At the other extreme, it would be ridiculous to use one report to confirm a fragment, since some may report some bran flakes as fragments. Any accuracy ratings based on one report to confirm a fragment would encourage the indiscriminate reporting of all dubious particles as fragments.

Eliminating one and five as confirming numbers still leaves two, three, and four to choose from. There is generally at least one collaborator in a group who tends to report many more fragments than the rest. If two were taken as the confirming number, a high report would have too much influence on the determination of the number and location of confirmed fragments.

As will be shown later, visual acuity plays an important part in fragment counting accuracy. It was thought that a choice of four reports to confirm a fragment would not give this factor enough weight. Three was therefore chosen as the logical confirming number.

Table I summarizes the analysis of the master report (Fig. 1). The heading 100 C/R represents the proportion of the fragments reported by a person that were confirmed by the reports of others. Generally, there is a tendency for those who report the lower totals to score the highest here. The individual who is somewhat unsure of himself will tend to report nothing but very obvious fragments (legs, head capsules, mandibles, etc.). Such fragments are sure to be found by at least two others, which will give him a high percentage of confirmed-to-reported fragments.

TABLE I

CALCULATION OF ACCURACY RATINGS (INSECT FRAGMENTS)[a]
(Set 5, Unstained Slide — K = 105)

Collaborator No.	Time	R	C	100 C/R	100 C/K	A.R.
1	75	104	79	76	76	76
2	85	74	60	81	57	65
3	?	66	57	86	54	65
4	30	11	10	91	10	37
5	250	194	71	37	68	58
6	90	73	66	90	63	72
7	80	72	65	90	62	71
8	60	60	60	100	57	71
9	105	99	83	84	79	81
10	65	72	63	88	60	69
Av.	93	82	61	82	59	67

[a] K = total confirmed fragments (three reports confirm a fragment); Time = working time to nearest 5 minutes; R = number reported; C = number of confirmed fragments found; A.R. = accuracy rating = (100 C/R + 2 (100 C/K))/3.

The heading 100 C/K represents the percentage of the total number of confirmed fragments that each collaborator has found.

The figures under the heading A.R. are the accuracy ratings. They are weighted averages of the 100 C/R and 100 C/K scores. Both of these scores are measures of accuracy. The 100 C/R score is an expression of an individual's ability to locate easily recognizable fragments. However, it is quite possible for a person to report only one fragment on a slide, and score 100 in this column. If this were used as the sole criterion of accuracy it would discourage the reporting of anything but very obvious fragments.

The 100 C/K score is an expression of a different kind of accuracy. This is a measure of ability to find fragments that others also have found. While this score is also an expression of accuracy, it should not be used as the sole criterion. To do so would encourage the indiscriminate reporting of dubious particles as fragments. It was thought that a combination of these two scores would give a more reliable indication of accuracy than either one, used separately. Consideration of the 100 C/R score should tend to discourage indiscriminate reporting of dubious particles as fragments. Consideration of the 100 C/K score should encourage collaborators to seek out and report every possible fragment.

The mean 100 C/R score of 82 and 100 C/K score of 59 are normal for all sets. In every instance, the mean 100 C/R score was much higher than the mean 100 C/K score. Since it is more difficult to attain a high 100 C/K score, this score was given the most weight in the calculation of accuracy ratings. Therefore, in the calculation of fragment-counting accuracy ratings, the 100 C/R score

is given a weight of one and the 100 C/K score a weight of two. Accordingly the following formula was devised: A.R. (fragments) $= (100\,C/R + 2\,(100\,C/K))/3$.

As to rodent hairs, a slightly different condition prevails. On slides containing large numbers of rodent hairs, proportionately fewer fibers are present that might be mistaken for rodent hairs. Accordingly a higher premium can be given for high 100 C/K scores without encouraging the reporting of particles other than rodent hairs as such. Accordingly the following formula was devised: A. R. (rodent hairs) $= (100\,C/R + 3(100\,C/K))/4$. All other factors are the same as for fragments. Three is the confirming number, and K is determined in the same way as for fragments.

When large numbers of fragments are present, many of them can be recognized as namable parts. Such fragments as mouth parts, antenna segments, leg and foot parts, cerci, and large pieces of wing-cover would come under this category. Anyone with any experience at all should be able to recognize one of these namable parts instantly, as a fragment, even though he may not be able to name it. If such a fragment is present in a square, and a collaborator fails to report it, it must be assumed that he failed to see, rather than to recognize it. Following this line of reasoning, the namable parts were located and the reports checked to see who had reported them. The percent of these namable parts that each person reported became a relative measure of his visual acuity. This figure has been called the Visual Acuity Quotient, abbreviated as A.Q. Table II shows how the A.Q.'s worked out for set 5.

TABLE II
VISUAL ACUITY DATA[a]

Collaborator No.	K = 50 Found (F)	A.Q. (100 F/K)
1	43	86
2	29	58
3	26	52
4	11	22
5	33	66
6	41	82
7	32	64
8	40	80
9	11	22
10	33	66

[a] K = total number of namable fragments present on slide; F = number of namable fragments reported by each collaborator; A.Q. = visual acuity quotient. The namable fragments which were used as a basis for the calculation of Visual Acuity Quotients were located by Mr. K. C. Kimball of the San Francisco office of the U.S. Department of Agriculture, Agricultural and Marketing Service, Processed Foods Standardization and Inspection Branch.

Coefficients of Correlation

Accuracy is due to many factors. Some of these factors include knowledge of the criteria of identification, visual acuity, and patience. It has not been possible, through the medium of the cross-sectioned slide technique, to measure relative knowledge of the criteria of identification. However, a rather crude measurement of visual acuity has been made. If the amount of time spent on a slide is something of a measure of an individual's patience, then this information can be obtained from the reports.

In Table III, visual acuity quotients, time spent, and numbers reported have been correlated with one another and with accuracy ratings. In plotting the data for these calculations, accuracy ratings and visual acuity quotients were taken, without change from the original reports. "Time" was plotted as "log time." The relationship between "time" and accuracy ratings should be logarithmic, rather than straight-line. For example, if a collaborator spends 20 minutes on one slide and 40 minutes on another, the increase in accuracy should be more evident than if he had spent 100 minutes on one slide and 120 minutes on the other. Also, the time data were not normally distributed, and the spread between high and low was so great that they could not be plotted conveniently. However, when logarithms of times reported were used, the data were distributed normally.

TABLE III
COEFFICIENTS OF CORRELATION[a]

Comparison	Fragments			Rodent Hairs	
	Stained Slides	Unstained Slides	All Slides	Stained Slides	Unstained Slides
1. A.Q. vs. log time	....	....	+0.21	....	....
2. A.Q. vs. log R/av.	+0.40**	+0.41**	....	+0.51**	+0.44**
3. Log time vs. log R/av.	+0.27*	+0.34**	....	+0.49**	+0.23*
4. A.R. vs. log time	+0.29*	+0.33**	....	+0.20	+0.33**
5. A.R. vs. A.Q.	+0.51**	+0.67**	....	+0.39**	+0.48**
6. A.R. vs. log R/av.	+0.70**	+0.74**	....	+0.49*	+0.51**

[a] A.Q. = visual acuity quotient; R = number reported; Time = time spent in reading slide (to nearest 5 minutes); A.R. = accuracy rating.

"Number reported" could not be used directly because slides were prepared by different methods, and the actual amounts of contamination present varied considerably from one slide to another. For this reason, a reasonable figure for one slide might be unreasonable for another. It was necessary to relate these figures to some other factor that would be indicative of the number present. The ratio "number reported/average" represents an attempt to adjust "numbers reported" to a common basis, so that comparisons could be made between the sets of data. Logarithms of the ratios were used, since such data were distributed normally.

None of the correlations are high enough to be used for prediction purposes. However, they should be of interest as a demonstration of trends. There appears to be little correlation (1, Table III) between visual acuity and working time. This was expected, because these are measures of entirely different personal factors.

Two general skills, ability to see (A.Q.) and ability to recognize (knowledge of the criteria of identification), influence accuracy in fragment counting. It has been possible to estimate visual acuity. An estimate of relative knowledge of the criteria of identification can be obtained only by inference. If visual acuity were the only skill involved in fragment counting, it would be expected that the correlation (2, Table III) would be much more strongly positive. Before a particle can be counted as a fragment it must first be seen and then recognized.

There is only a low positive correlation between working time and numbers reported. As visually acute persons may be either fast or slow workers, it might be inferred that those with a good knowledge of the criteria

may also be either fast or slow workers. Hence, the weak correlation between working time and numbers reported (3, Table III) is not surprising. Similarly, there is only a weak positive correlation (4, Table III) between working time and accuracy ratings.

Correlation 5 (Table III) is perhaps the most significant in the group. Since ability to see and ability to recognize are two general skills involved in this type of work, as the influence of one of these skills diminishes the influence of the other one should increase. The influence of visual acuity on accuracy in counting rodent hairs is less than it is on fragment-counting accuracy. From this it could be inferred that rodent hairs are more difficult to identify than are fragments. This conclusion is contrary to popular belief. The difficulty was that apparently too few persons were aware of the many types of degradation that a rodent hair may undergo when it is subjected to the digestive processes of the animal.

The hairs found in a rodent pellet may vary from "typical" through a multitude of steps to the absolutely unrecognizable. There is need for a commonly acceptable definition of a "reportable" rodent hair. It is hoped that a project can soon be instituted that will furnish guidance in the formulation of such a definition.

Number reported is one of the factors entering into the calculation of accuracy ratings, and therefore cannot be correlated with accuracy ratings. However, even a casual glance at the assembled data on these sets will show that those reporting the higher numbers of fragments and rodent hairs tend to score the higher accuracy ratings. The correlation (6, Table III) was calculated to show that this is not a perfect relationship. This should discourage anyone from indiscriminate reporting of large totals in an attempt to score higher in the accuracy ratings.

Value of "Mean"

In most collaborative analyses, the mean of the results reported can be considered to be the figure that most probably represents the correct answer. However, the correlations show that, in this type of work, those who do more careful work (spend more time) tend to report larger totals, and those with the higher visual acuity also tend to report higher totals. The correlations also show that these same groups also tend to do more accurate work. Disregarding correlation 6 in Table III, it can be inferred that those who report the higher totals tend to do the more accurate work. When the mean of all results is calculated, the low results submitted by the inaccura worker have just as much weight as the higher resul submitted by the accurate worker. The net effect is to pr duce a mean that is much lower than the true numb present.

Conclusions

Some of the factors affecting accuracy in counti fragments and rodent hairs, mentioned in increasing o der of importance, are working time, visual acuity, a numbers reported.

There is need for a commonly acceptable definiti of "reportable" rodent hair.

The mean of the numbers reported on a collaborati sanitation analysis is no measure of the true numbe present. The true number is probably much higher tha the mean.

Summary

Eight pairs of filter papers, containing fragment- an filth-bearing flour residues, were counted collaborativel The papers were marked off in cross-sections identified b letter and number. Ten collaborators reported total nu bers and locations of insect fragments and rodent hai found, as well as the time spent on each slide. An impr vised statistical treatment of the reports assigns numer cal accuracy ratings to the collaborators. Relative mea urements of visual acuity are obtained from the report Totals reported and working time are logarithmic re sponses. Coefficients of correlation have been calculate between the factors of number reported, working tim and visual acuity. All of these factors have been co related with accuracy ratings.

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. . . People

New appointments at central laboratories of General Foods, Hoboken, N. J.: **Bert Borders,** project leader; **Herman H. Friedman,** associate technician, product development; **Jo-fen T. Kung,** associate technologist, analytical chemistry section; **Harold Pokras,** associate, product development; **Charles J. Tressler,** project leader, product development; **Leonard M. Waldt,** associate technologist, product development; **Kathryn W. Weiss,** research librarian.

Myron Brin named chief biologist at Food Research Laboratories, Long Island City. He was research associate at Thorndike lab of Boston City Hospital and instructor in biological chemistry at Harvard.

William J. Davis to head sales operations in Buffalo area for Sterwin Chemicals, Inc.; will call on the baking and milling trades, food processing plants, and other industries served by Sterwin.

Charles N. Frey awarded 1956 Honor Scroll of American Institute of Chemists, New York Chapter, presented at the Institute's annual meeting in June. Well known for his research activities in yeast, bread, vitamins, enzymes, nutrition and fermentation, Dr. Frey was with Fleischmann Laboratories of Standard Brands, Inc., from 1926 to 1951; since then, he has been consultant and lecturer at M.I.T.

David R. Gross named chief chemist of Miner-Hillard Milling Co., Wilkes-Barre, Pa., from National Fruit Products Co.

Lloyd A. Hall, Technical Director, The Griffith Laboratories, Inc., has been named as the recipient of the 1956 Honor Scroll Award of the Chicago Chapter, American Institute of Chemists. Dr. Hall, a past Chairman of the Chapter, was chosen "because of his intense interest and influence in promoting truly professional attitudes and constructive actions in the profession of chemistry, his enthusiasm and positive direction in guiding and promoting the professional growth of young chemists, his very active participation and recognized leadership in both civic and technical organizations, and because of his outstanding technological accomplishments in industry."

The Honor Scroll will be presented to Dr. Hall at a Testimonial Award Banquet in Chicago on October 5, 1956.

Sidney Kahan leaves Food and Drug Administration to become chief chemist and food technologist of B. Manischewitz Co., Jersey City.

Robert P. Langguth promoted to group leader and will direct the food laboratory of Monsanto's inorganic chemicals division research department, Dayton.

Donald D. Pascal elected executive vp and **William C. Buffing,** treasurer, of National Starch Products.

Derrill B. Pratt, Jr., A.A.C.C. Treasurer, joins Pillsbury Mills' flour quality control department, Minneapolis, as technical consultant working with the baking industry; from Omar Inc., Omaha, Nebr., where he was Technical Director.

Bernard E. Proctor, head of food technology at M.I.T., received the Nicholas Appert Award for 1956 at the annual meeting of the Institute of Food Technologists this month. Notable among his interests is "cold sterilization" by radiation.

Gerald Reed named director of research of Red Star Yeast and Products Co., Milwaukee. Mr. Reed was formerly with Rohm and Haas, Philadelphia.

Robert W. Smith appointed sales manager of Hoffmann-La Roche bulk vitamin division, to succeed the late Chester C. Robinson. **Ralph C. Christiansen** promoted to special markets manager. **Richard D. Zucker** continues as assistant to vp, directs sales control.

. . . Patter

A Wheat Research Conference was held in Peoria, Ill., on June 11 and 12, under the auspices of the technical advisory committee of the Millers' National Federation. Reports were given on the principal wheat research projects now under way in USDA laboratories, each by the person primarily responsible for the particular project.

Speakers were N. W. Taylor, Dorothy Bradbury, M. J. Wolf, F. R. Senti, C. W. Hesseltine, D. K. Mecham, W. L. Deatherage, Majel M. MacMasters, R. J. Dimler, I. A. Wolff, J. W. Pence, J. C. Cowan, and R. G. Benedict.

• • • •

The American Institute of Baking celebrated the 20th anniversary of the synthesis of vitamin B_1 by honoring Dr. Robert R. Williams at a banquet in Washington, D. C., attended by 135 businessmen and scientists.

• • • •

The newly remodeled library at the Connecticut Agricultural Experiment Station was dedicated to Thomas B. Osborne in ceremonies held at the Station in New Haven on Wednesday, September 28, 1955. The principal speaker was Dr. E. V. McCollum, distinguished biochemist and authority on nutrition. Dr. Osborne's early work on vegetable proteins began in 1889 in a laboratory on the upper floor of what is now the library building. Here he laid the foundation for his later outstanding contributions to the knowledge of nutrition. On his retirement in 1927 he gave his scientific library to the station. For the occasion, the A.A.C.C. furnished a complete set of the Osborne Medal Addresses that have been published since the Thomas Burr Osborne Medal Award was founded in 1926, as a tribute to Dr. Osborne's fundamental studies of the cereal proteins and distinguished contributions to cereal chemistry.

• • • •

Established in 1931 by the late Dr. N. E. Gordon to stimulate research, the Gordon Research Conferences will be held throughout this summer, for the 25th year, at Colby Junior College, New London, N. H.; New Hampton School, New Hampton, N. H.; and Kimball Union Academy, Meriden, N. H. The sessions begin on June 11 and end August 31. Famed scientists from a dozen countries will be guest speakers.

HOT-WEATHER HINTS FOR OPERATING RHEOLOGICAL INSTRUMENTS

by C. W. Brabender*

It is well known that, in any rheological measureme of doughs, rigid temperature control is of utmost i portance. More mistakes and failures in accuracy in phys cal tests are due to lack of temperature control than any other reason. Until recently, homemade provisio for achieving temperature control on hot summer da have been in use. Many such set-ups have led the auth to believe that the implications of temperature control i connection with the circulating pressure thermostat a not fully understood, and, therefore, cooling equipme has often been inefficient and/or costly.

In a farinograph, for example, all parts coming i contact with dough or having an influence on curve tra ing, such as the dash pot oil viscosity, are temperature controlled by a circulating pressure thermostat, feedin water through jacketed walls of the mixer or dough shaping equipment. There is a general belief that th main problem is to compensate for the heat generated i the mixer itself. Heat is generated, of course, but on a h summer day when environment temperature is above 30 C. (the temperature under which dough-testing equip ment is usually operated), the heat produced by knead ing is negligible compared with that transferred fro environment air through the large surface of the pressur thermostat water container into the water circuit. Tha this is not sufficiently understood seems evident in th unusually large cooling units being used. These could b reduced in size or eliminated entirely by insulating th thermostat on the outside. This insulation can be simple it is usually sufficient to put the whole pressure thermo stat in a cut-off cardboard container, filling a space of a least 1½ inches between them with glass or rock wool.

When tap water of 26°C. or less is available for cool ing, this simple modification will take care of the whol cooling operation and no extra cooling unit is needed. The cooling coil built into the thermostat must be proper ly dimensioned or, if not, must be replaced by a suffi ciently large coil which can be produced easily by any maintenance shop. Where, however, water temperature i above 26°C., other arrangements are necessary (see draw ings, numbered 1 to 4).

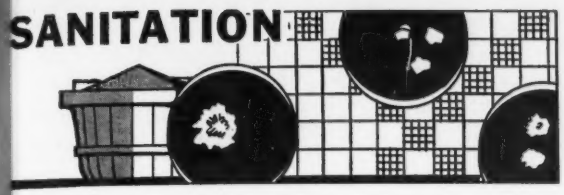
1. A commercially available condenser coil (used i refrigerator units), put into a refrigerator, cools down the tap water; a solenoid valve, hooked up with the relay circuit of the thermostat, controls the cooling water circuit.

2. Where laboratory space permits, the thermostat i installed in such a way that cold air from a window air conditioner circulates around it and cools off the surface.

*C. W. Brabender Instruments, Inc. Excerpts from a paper presented at the 41st Annual Meeting of the American Association of Cereal Chemists, New York, May 20-24, 1956.

(Please turn to page 79)

SANITATION



EXTRANEOUS MATTER IN FOODS

Problems of extraneous matter in foods were discussed and current methods of identification and treatment were clarified at a conference on April 16 held at the University of Syracuse.

Ernest Reed, Chairman of the Department of Plant Sciences at Syracuse, opened the meeting and summarized problems of odors and chemicals in paper containers used in food packaging. He cited work with the Paper Cup and Container Institute and paper converters in educating paper manufacturers to the importance of sanitary paper stocks for food packaging. Preservatives and agents used in paper manufacture to suppress the growth of molds and bacteria "bleed" into packaged foods, he said. Such agents, along with germicides in paper adhesives, must be carefully considered with food packaging in mind. It is cheaper and otherwise to the mills' own advantage (fewer problems and fewer shutdowns, etc.) to use sanitary production methods for *all* paper products rather than for food packaging papers alone.

Fred B. Jacobson of Vogel-Ritt discussed the application of A.O.A.C. methods for extraneous material in chocolate and candy manufacturing. Many basic A.O.A.C. methods, although satisfactory, are time-consuming. Use of a basket of screening material, instead of an ordinary sieve, speeds up operations. Washing out most of the chocolate with petroleum ether, followed by trap-flask extraction of the residue, is satisfactory. Centrifugal procedures are being evaluated. Estimates of the amount of shell present in coconut by counting spiral vessels in a Howard mold-counting chamber appear almost as accurate as the lengthy A.O.A.C. pectic acid determination.

Rodent hairs in cocoa butter are detected rapidly with petroleum ether extraction. Some rodentlike hairs were traced to the use of rabbit-hair felt in industrial filtration.

R. J. Yero of Libby, McNeill & Libby discussed the corn sap beetle, which is rather new to the Midwest; infestation was relatively light in 1954, increasing in 1955. DDT does not control this beetle as it does the corn borer and earworm. It migrates from ear to ear and crawls between husk and kernels, where it cannot be reached with sprays, laying its eggs and causing damage all over the ear, in contrast to the damage of other pests which has been localized on the ear and could be trimmed off in the canning process. Corn varieties having a tight husk which the beetle cannot get into are therefore recommended as being more resistant. Since the adults move to the soil to pupate, soil treatment with dieldrin will be tried out during the 1956 season. Row crop spraying is considered the most efficient and effective.

Insects and insect fragments received the greater part of the attention at the conference. John E. Despaul summarized work done by the Quartermaster Corps to determine the effectiveness of packaging materials against insect penetration. Cotton was the poorest protection, paper the best. Sealing thread holes with plastic or paraffin protects the food from most insects, but some will deposit their eggs through the paper. Foils and cellophane resist penetration because the smooth surfaces prevent the insect's getting firm traction for boring. However, much of the penetration of insects is not actually from boring holes in the package but through entranceways left by closure machines, folded ends, and seams. Food packaging and warehousing premises, of course, should be kept sanitary as a preventive measure.

Kenton L. Harris (U.S. Food & Drug Administration, Division of Microbiology) discussed microscopic analysis in food and drug control, with analytical methods appearing in *Methods of Analysis of the A.O.A.C.* Current regulatory activities are based on both inspection of food processing plants to determine whether foods are being prepared, packed, or held under insanitary conditions, and on analytical evidence to determine whether contamination has actually taken place.

Work on insect fragments is concentrated on identifying the fragment rather than just counting the number present, and is designed to reveal where an infestation came from and under what conditions the food has been stored or processed. In flour, for example, fragments of an insect not associated with normal production indicates contamination during processing or storage; but a heavy count of an insect normally found in wheat is evidence of contamination before milling.

Recovery of insect fragments from flour was discussed by F. S. Thatcher of the Canadian Food and Drug Directorate. His talk was essentially a review of the paper appearing in *Cereal Chemistry* (30: 71–102. 1953) with additional information from surveys made in 1952 and 1953. The method consists of hydrochloric acid digestion and flotation with petroleum ether in a separatory funnel. Under this procedure, insect contamination in mills was positively correlated with the presence of rope and flat-sour organisms, thermophiles in general, mold counts, and insect excreta.

Ross Cory's paper on the use of semipermanent mounts in sanitation collaborative work was read. (See Mr. Cory's two articles starting on page 68).

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ANNUAL REPORT FOR 1956
A.A.C.C. FARINOGRAPH STANDARDIZATION COMMITTEE

While it was planned that the concern of this Committee would be primarily the calibration and standardization of farinograph techniques, the discovery that no farinograph method had been proposed for the 6th edition of *Cereal Laboratory Methods* made it necessary to postpone these normal objectives until an adequate method could be prepared.

Two different methods are proposed: 1) the so-called

Constant Flour Weight procedure which has been used at least in principle by a majority of farinograph operators; this employs either 50 or 300 g. of flour (14% moisture basis) and involves absorption determination by titration to maximum consistency at 500 B.U.; and 2) the Constant Dough Weight method, strongly endorsed by a minority group which believes that it has a superior scientific basis; it requires simultaneous adjustment of both flour and water, utilizing charts or graphs, in order that when the maximum consistency is 500 B.U. the final dough weight shall always be 480 g.

Publication of two methods which can yield different farinograph values with the same flour may raise an element of uncertainty. The instructions state clearly that the method employed must be specified in any report of farinograph values. The majority of this committee felt that abundant precedent for publication of alternative procedures exists in *Cereal Laboratory Methods*, and that future collaborative investigation will indicate which of the methods proposed is preferable.

Extensive correspondence during the year not only between members of this Committee but also with collab rators in the Farinograph National Check Sample sugge ed that the following problems also require attention:

1. Determination of factors causing variability amo different bowls, and the effect of bowl shape factors a mixing speeds on farinograms.
2. Standardization of mixing bowls and mixing speed
3. Development of farinograph methods for testing so wheat flours.
4. Standardization of dash-pot settings and farin graph band widths.
5. Utility of expressing weakening in terms of area u der the curves.

Respectfully submitted,

MAX MILNER, *Chairma*
ROBERT LASTER
STEPHEN J. LOSKA, JR.
C. W. OFELT
J. W. PENCE
D. B. PRATT

Cocoa in Today's Foods:

(Continued from page 57)

veloped which will have a stabilizing effect on prices of raw cocoa. This type of coating will not entirely take the place of chocolate, but in many cases it produces a very satisfactory and acceptable product from all standpoints."

Is Chocolate Here to Stay?

I think we are agreed that chocolate *flavor* is here to stay. Next to vanilla, it is the most popular flavor used in the United States. But if cacao beans are to maintain their standing as a food of very desirable flavor, rigid control of production must be eased and a more abundant supply must be available. It is my opinion, however, that the industry is not taking the action necessary to increase production.

Cereal chemists, who comprise an important segment of the food industry, will continue to improve products containing cocoa and chocolate. If the cocoa industry will emphasize greater production of cacao beans, we in the food field will continue not only to use cocoa products but to search for new uses for them.

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The Technical Diplomat:

(Continued from page 59)

teamwork between the two. Several milling firms, at least, now look upon their bakery service personnel as an arm to their products control division.

As with most professions and vocations today, bakery service activities have fallen into specialized areas. Problems in the bread field are also encountered in the production of cakes, rye bread, crackers, and cookies.

The bakery service worker who is enthusiastically concerned with the fortunes of his principals will, consciously or unconsciously, be of great assistance in helping to train salesmen and in building and sustaining high morale in the field sales organization.

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Feed Manufacture:

(Continued from page 63)

cidiostat at the preventive level. Hormones such as diethylstilbestrol are now being fed to cattle, with an increase in average daily gain and a decrease in actual amount of feed required to produce that gain.

One of the most phenomenal developments in the history of nutrition has been the utilization of antibiotics in feeds since 1950. The actual mode of action of antibiotics is still a little abstract, but it is known that there is some relationship to disease level and the degree of sanitation of environment.

Arsonic compounds, too, ha shown growth-stimulating effects a their use in poultry and swine fee will probably increase. The use antioxidants in feeds is new, a they are now being increasingly ut ized for the purpose of protecti various nutrients — known and u known — against oxidation.

Dr. L. C. Norris of Cornell U versity and Dr. J. R. Couch of Te as A & M College recently announce that growth response could be pr duced in chicks by feeding the mine al or ash fraction of distiller's dri solubles and the ash of other unide tified growth-factor sources. Th work has served to reemphasize a stimulate further research and intere in the importance of minerals.

Poultry by-products such as h drolyzed feathers and "poultry off meal" are becoming accepted as tw standard feed ingredients. Waste an mal fat and vegetable fats are bei used in increasing quantities in feed and one leading research worker pr dicts that the already great accom plishments in nutrition research an feed formulation will be oversha owed by those of the next 10 year

The need for new and improve products through scientific researc is an ever-increasing one in this gre and growing feed manufacturing in dustry.

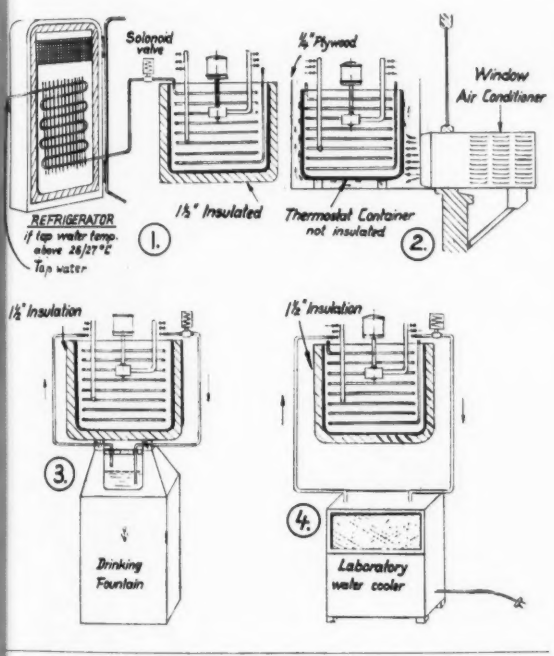
Hot-Weather Hints:

(Continued from page 76)

In this case, the thermostat container must not be insulated.

3. A water bottle type drinking fountain is used. The bottle is removed and the pressure thermostat, in this case insulated, is set up in the same space. One water circuit is used to pump water through the water-cooling container of the fountain. This circuit also is controlled by a solenoid valve.

4. This applies when none of the other suggestions is feasible and when tap water is too warm, and employs a laboratory type of water cooler. The smallest types of laboratory water coolers are sufficient, and considerable money can be saved if the pressure thermostat container is insulated.



Suggestions for Farinograph Pressure Thermostat Cooling

Any method avoiding the use of mechanical refrigeration equipment seems preferable, for the simple reason that this equipment is subject to leakage or other trouble during long periods of nonuse in winter.

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OVERSEAS REPORTS

. . . Italy

The first Symposium of Italian Cereal Chemists, organized under the auspices of the trade paper *Technica Molitoria*, was held in Rome September 12-16, 1955. Prof. Borasio, director of the Experimental Institute of Rice Culture in Vercelli, presided. Dr. Otto Sydow of Monaco was guest of honor.

The first subject of discussion was the problem of modifying legislation which prohibits treatment of flour in Italy. Prof. Muntoni of the Department of Health spoke with confidence that a law allowing enrichment will be passed, but said it is impossible as yet to announce details.

The amount of moisture in grain and its products was discussed. Grain conditioners, Prof. Muntoni said, are technically necessary, even in small mills, and should be installed, even though the price makes them almost prohibitive to small mills.

Legislative controls of flour moisture should be applied only to the final product—bread—and not to flour itself, an intermediate product. Examination of flour should be done by the baker at the time of purchase.

On the question of flour enrichment, Dr. Cuneo reported on proceedings at the Congress on Bread at Hamburg; Dr. Sydow spoke on current legislation in Germany and economic losses caused there by a journalistic campaign against enrichment.

Prof. Gino Secchi read a paper on dietetic products and the potential and practical biological value of cereal derivatives. Dr. Sergio Monari spoke on enrichment of flour and of alimentary paste(s) in Italy. Prof. F. Lorenzola spoke on the use and determination of calcium phosphate and magnesium phosphate added to foods of cereal origin.

Really hot arguments developed on the toxicity of disinfectants used on cereals. Dr. Borghesani's paper favoring the use of methyl bromide was in violent opposition to the one following, by Prof. Muntoni. Prof. Biagini gave information about an efficient, noninjurious new disinfectant.

Prof. Borasio was named chairman of a committee with authority to call the next convention of cereal chemists and to organize a basis for an association. Other members of the committee are Profs. Finzi, Fabiana, and Montefredine, and Dr. Cuneo.

On the last day of the meetings Prof. Sydow showed documentary films about pneumatic mills, disinfection, refrigeration of bread, and the merits of paper bags for flour.

C. OTTAVIO

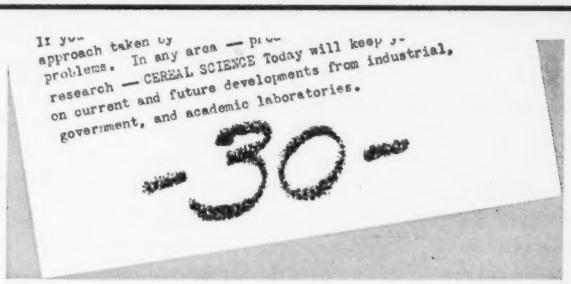
Observations

Wheat harvesting has progressed into southern Kansas. The samples we have received from Oklahoma have been very erratic this year. The protein level is very high, averaging over 14%, and the test weight 59 lbs. or above. The mills are producing a good yield of flour. However, the ash level of the flours has been very irregular, varying from 0.39 to 0.49% at approximately the same extraction. The curve character has also been irregular in comparison with the 1955 crop.

The most marked difference of the new crop is in the performance of the flours in the bakeshop. Some of these high protein flours produce excellent bread, while others have only fair volume and exhibit poor grain and texture. The farinograph peak time is more indicative of the mixing requirement of flours this year than it was last year; however, the farinograph absorption does not correlate with the absorption requirement in the bakeshop. Farinograph absorptions are much lower than actually needed to produce good machining doughs.

A few Kansas samples have gone through our milling and baking department. These have been very high protein, low test weight, and high moisture wheats. The farinograph curves and baking performance have been fair on these early samples.

Jim Doty



A BACKWARD GLANCE

Another Annual Meeting is now past history. It was outstanding for a number of reasons, all the result of excellent advance planning and good coordination on the part of the Local Committees.

As a tourist attraction, New York is hard to beat. The local men responsible for the convention took advantage of this fact, but only as a means of supplementing an already strong program. The two free nights provided ample opportunity for members to "see the town" without having to pass up any social function sponsored by the Association. The large number attending the President's Reception, as well as the record-breaking ticket sale for the banquet, certainly substantiates this point.

The technical program was unusually good. Concurrent sessions, used for the first time in many years, were necessary to accommodate the large number of papers presented. The Monday sessions on Nutrition and the Wednesday morning session on Feeds drew to our meeting a number of outsiders who registered for one or two days. This is a healthy situation and one which should be promoted by every Program Chairman.

The one disturbing element—not peculiar to New York but accentuated by the concurrent sessions—was the difficulty of keeping papers on schedule. This is a problem that cannot be satisfactorily solved without the wholehearted cooperation, not of the speakers alone but of every member attending the meeting. First, a speaker must learn to stop when his time is up, whether he is finished or not. There is no excuse for overtime on any paper, unless it occurs during the discussion period. Second, members who expect the program to be maintained on schedule should cooperate by being *on time* at the start of a session. As much time is lost by late starts as by overtime on papers. No one can expect a session chairman to start a speaker if only ten or fifteen people are in the meeting while ten times that number are milling about in the hall. Let's try to change this situation next year. You'll appreciate it the next time you're "first man up."

CONTEST WINNERS

Among the many interesting sidelights at the New York meeting was the contest sponsored by Sterwin Chemicals. The boys from Sterwin set up one of their dry powder feeders and offered prizes to those who most closely estimated its delivery rate. The winners were: Mrs. Stuart White, Mrs. Arthur Gust, and Miss Marjorie Howe in the ladies' division; Ric Palomba, E. J. Kiteley, Eldon Smurr, Fred Wheeler, and Allen M. Cohan in the men's division.

A.A.C.C. GROWTH

Many of you are probably aware of the intensive membership campaign that has been waged during the past six or eight months. This effort has started to pay dividends with over 110 new members accepted thus far and prospects for another 25 to 40 before the September 1 deadline. If you know of anyone who has been considering membership in the A.A.C.C., urge him to submit his application now, on a form you or he can obtain from your Local Section chairman or by writing to the St. Paul office.

NEW ADDRESS FOR AACC TREASURER

Your attention is called to an address change for our National Treasurer, D. B. Pratt, Jr. Effective immediately, Mr. Pratt's address will be as follows:

Mr. D. B. Pratt, Jr.
Pillsbury Mills, Inc.
Minneapolis 2, Minn.